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THE LANCET

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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

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Order and Disorder in the Cerebral Circulation
SIR RUSSELL BRAIN, F.R.C.P. 85

Staphylococcal Postoperative Wound Infection
SHEILA McDONALD, M.B., MORAG C. TIMBURY, M.B. 863

Oliguria with Urine of "Fixed" Specific Gravity
A. M. JOEKES, M.R.C.P., J. F. MOWBRAY, M.B., K. DORMANDY, M.R.C.P. 864

The Electroencephalograph in Liver Disease
B. G. PARSONS-SMITH, F.R.C.P., W. H. J. SUMMERSKILL, M.R.C.P., A. M. DAWSON, M.R.C.P., SHEILA SHERLOCK, F.R.C.P. 867

Outpatient P.A.S. Therapy
W. M. DIXON, M.R.C.P., PETER STRADLING, M.R.C.P., I. D. P. WOOTTON, M.B. 871

Needle Biopsy of the Parietal Pleura
Squadron-Leader PAUL MESTITZ, M.R.C.P., A. C. POLLARD, M.B., Flight-Lieutenant M. J. PURVES, M.B. 873

Unilateral "Emphysema"
A. C. DORNHORST, F.R.C.P., P. J. HEAF, M.R.C.P., S. J. G. SEMPLE, M.R.C.P. 875

Direct-Vision Pulmonary Valvotomy During Pregnancy
RAYMOND DALEY, F.R.C.P., G. K. HARRISON, F.R.C.S., I. K. R. McMILLAN, F.R.C.S. 875

Cœliac Disease with Atrophy of the Small-Intestine Mucosa
JACK SAKULA, M.R.C.P., MARGOT SHINER, M.R.C.S. 876

SPECIAL ARTICLES

Family Care Systems in Norway and Holland
J. K. WING, M.B. 884

PUBLIC HEALTH

Infection of Volunteers with Asian Influenza Virus
ALICK ISAACS, M.D., G. NEGRONI, M.D., D. A. J. TYRRELL, M.R.C.P. 886

The Accident at Windscale 887
Influenza 887
Home Safety Week 887
The Third Quarter in England and Wales 887
Swedish Statistics 887

MEDICINE AND THE LAW

A Difference of Diagnostic Opinion Not Negligence 898

IN ENGLAND NOW

A Running Commentary by Peripatetic Correspondents 890

OBITUARY

Clifford White 899
Reginald Myers Atwater 900

LEADING ARTICLES

Anæmia after Gastrectomy 879
Expectorants Old and New 880

ANNOTATIONS

P.A.S. and the Patient 881
International Classification of Diseases 882
Liver Flukes in Man 882
Diagnostic Pneumoperitoneum ... 882
Public Health: A Time of Change 883
Nobel Prizeman 883

SYMPOSIA

Antibiotics 888

REVIEWS

Notices of Books 877

NOTES AND NEWS

The State of Food and Agriculture 900
Industry and Philanthropy 900
Lung Disease in Coalminers: New Research 901
First International Bioclimatological Congress 901

LETTERS TO THE EDITOR

Bacteria and Influenza (Dr. Patricia Jevons, Dr. C. E. D. Taylor, Dr. R. E. O. Williams) 891
Influenza Complicating Heart-Disease in Pregnancy (Dr. A. D. T. Govan, Dr. H. R. F. Macdonald) 891
Noradrenaline in Shock (Prof. B. G. Maegraith, F.R.C.P.) 891
Inadequacy of General Anæsthesia for Abdominal Operations (Dr. W. N. Rollason) 892
Malignant Argentaffinoma with Flushing But Without Widespread Secondary Deposits (Mr. I. S. M. Jones, F.R.C.S.I.) 892
Treatment of Tuberculous Meningitis (Dr. J. Lorber) 893
Sterilisation of Syringes by Infra-Red Radiation (Dr. E. M. Darmady, Dr. K. E. A. Hughes, W. Tuke) 893
Fatality from Surgical Conditions in Teaching and Non-Teaching Hospitals (Prof. Robert Platt, F.R.C.P., Mr. J. C. Barrett, F.R.C.S.) 893
Strapping for Pleural Pain (Dr. A. L. Wyman) 893
Left-Heart Catheterisation (Dr. D. G. Greene, Dr. G. T. Griffith) 894
Acroparæsthesiæ and the Carpal-Tunnel Syndrome (Dr. P. A. Walford) ... 894
Ileostomy Chemistry (Dr. M. Lubran, Dr. N. F. Coghill, Dr. P. M. McAllen) 894
Mitral Stenosis with Pulmonary Hypertension (Dr. J. Mackinnon, Dr. E. G. Wade) 895
High-Pressure Oxygen and Radiotherapy (Dr. Cyril Sanger) 895
Acute Renal Failure After Intravenous Pyelography (Dr. Judith Székely) 895
Substance Masquerading as Aldosterone (Mrs. Antonia van Zeelst, CHEM. DRA., Dr. F. Schwartz, Miss Antonia Fast) 896
Intrarectal Implantation of the Uterus (Dr. I. T. Patrick, Dr. E. D. Connan, Dr. A. K. Halder) 896
Toxic Reactions After Intravenous Iron (Dr. J. T. Bhatt) 897
An Objective Method of Determining Age in the Newborn (Dr. Sam Brody) 897
Lupus-Erythematosus Cells (Dr. H. Barsoum) 897
Second Thoughts on Anticoagulant Treatment for Myocardial Infarction (Dr. Frank Marsh) 898
Meprobamate (Dr. J. Gibson) 898
Effect of *d*-Tubocurarine Chloride on Blood-Pressure of Anæsthetised Patients (Dr. W. A. D. Combe) ... 898
An Influenzal Suggestion 898

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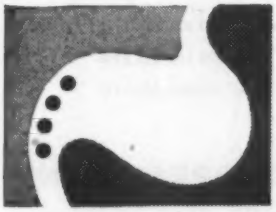

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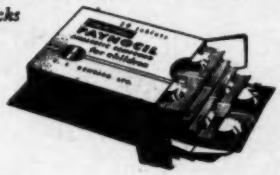

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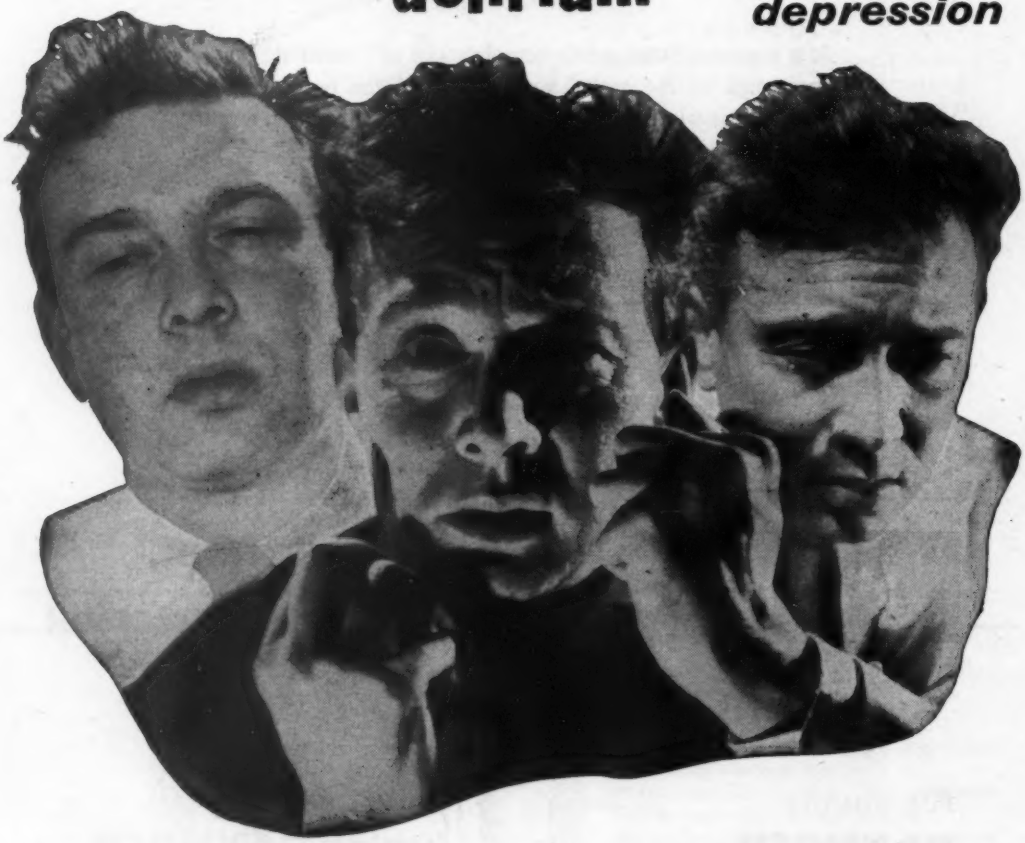

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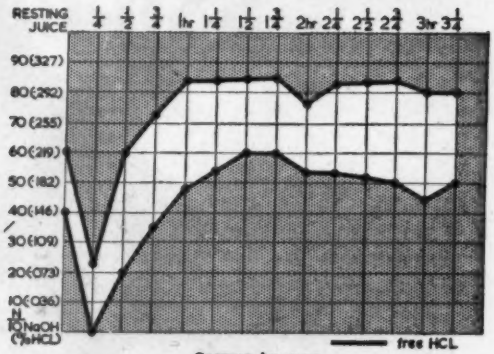

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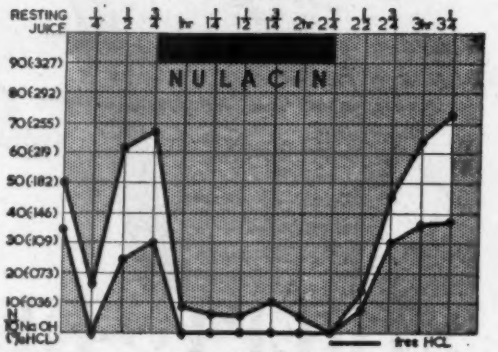

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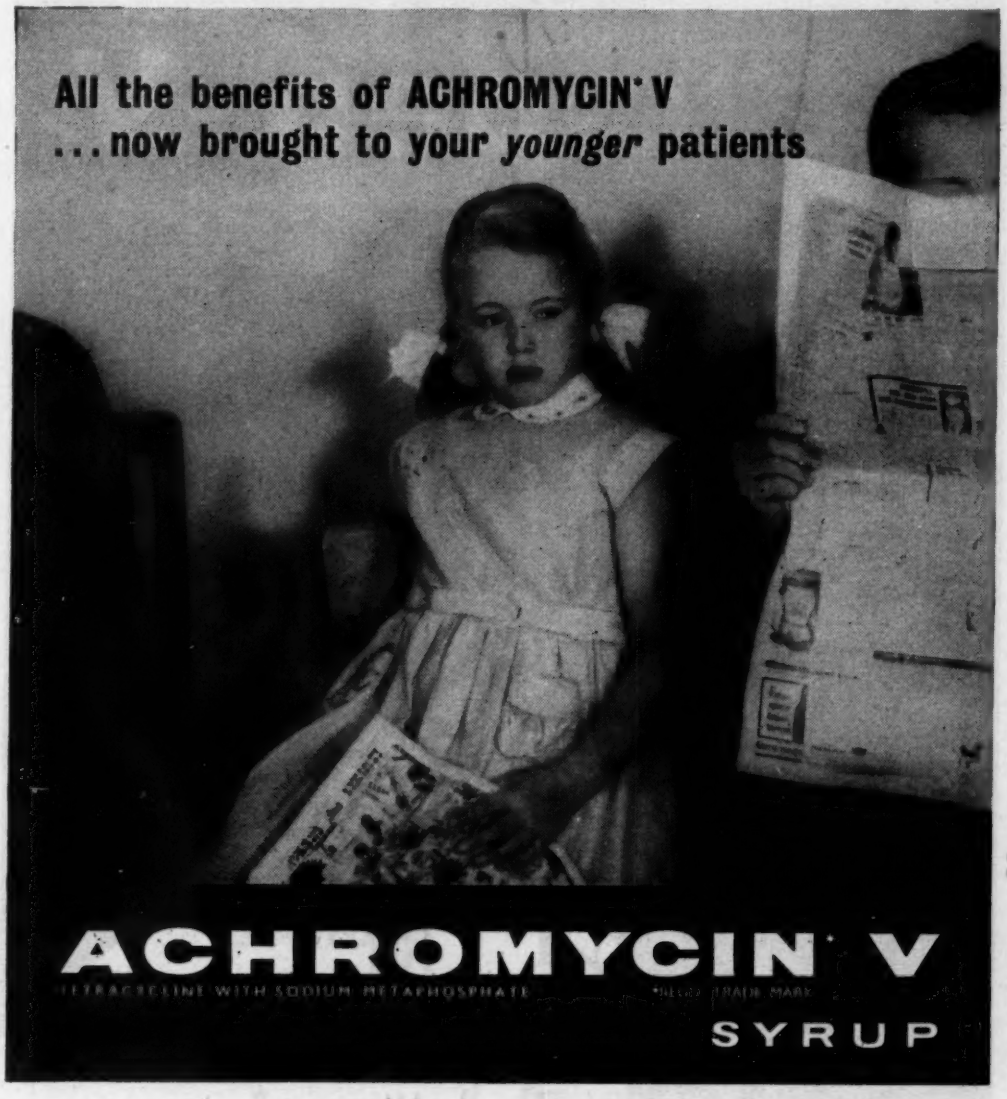

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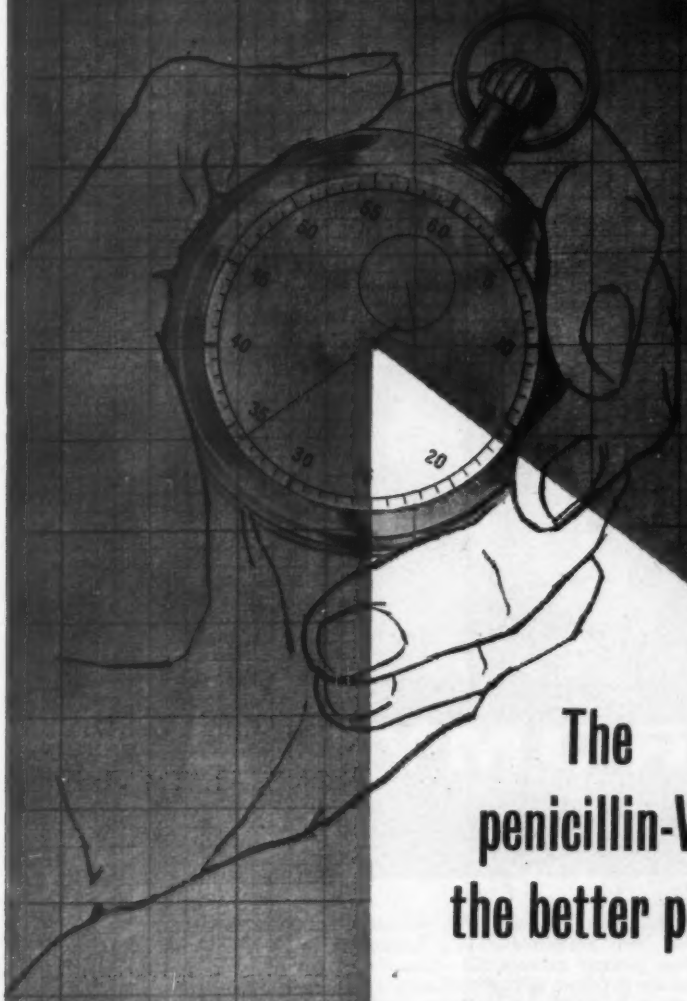

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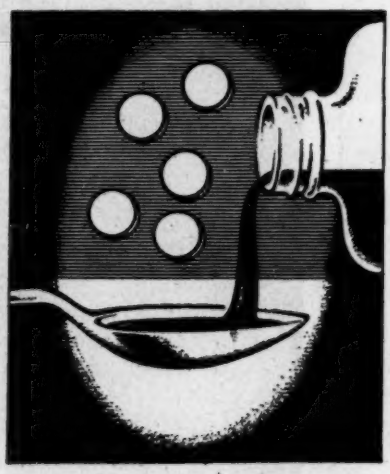

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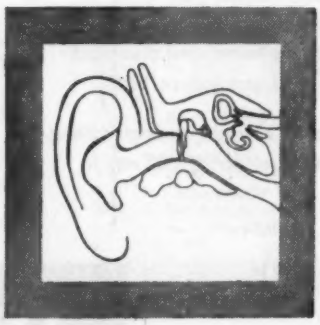

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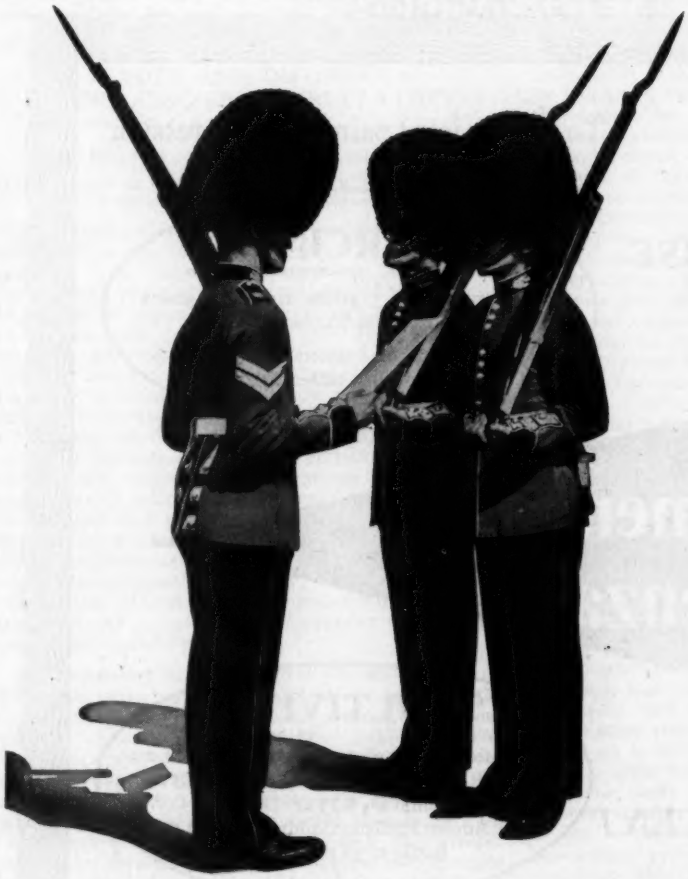

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OUR knowledge of the cerebral circulation, both in health and in disease, has entered a phase of rapid expansion. A recent supplement to *Physiological Reviews* (Kenk and Nall, 1952), consisting of an annotated bibliography of papers on the physiology of the circulation of the brain published between 1938 and 1948, cites some 2000 communications, and it is likely that at least as many more have been published since then. As a result of recent work it is now possible to form a fairly clear picture of the main factors concerned in the regulation of the cerebral circulation, and the way in which it becomes disordered in certain diseases, and, perhaps most important of all, where the boundary between our knowledge and our ignorance lies.

In this lecture I propose to begin by describing how Harvey's discovery now applies to the circulation through the brain, and I shall follow Harvey in drawing freely upon comparative anatomy. Then I shall go on to discuss the value of this new knowledge for our understanding of the symptoms and treatment of some disorders of the cerebral circulation.

Regulation of the Cerebral Circulation

The most important fact about the regulation of the cerebral circulation is its peculiarly close dependence upon the systemic blood-pressure. Schmidt (1950) in his monograph states that the present state of our knowledge supports the view that the cerebral circulation normally tends to follow passively upon changes in arterial pressure to a greater extent than is the case in most other organs, but it probably has greater capacities for resisting or compensating for such changes than has been suspected. Although constriction of cerebral blood-vessels has been demonstrated after stimulation of sympathetic nerves, the significance of this is by no means clear, and in Schmidt's view the signs of cerebral vasoconstriction revealed by direct instrumentation of the cerebral cortex in the cat or rabbit should be regarded as a vestigial remnant of an undesirable type of control rather than as an expression of a physiologically useful and important mechanism. Although there is also evidence of a vasodilator cerebral innervation, the functional significance of this is at present wholly unknown.

There is little evidence that either vasoconstrictor or vasodilator drugs in pharmacopœial doses have any effect upon the cerebral blood-vessels in man, and Schmidt utters a warning against applying to man conclusions drawn from experimental observations in cats, and even in monkeys. The cerebral vessels, however, are dilated by all the usual products of metabolism (decreased oxygen, increased carbon dioxide, increased acidity, and increased temperature) as well as by a number of other agents which have recently come to be associated with cellular activity; and they are constricted by some of the reverse changes, especially by increased oxygen and decreased carbon dioxide. It would seem that carbon-dioxide tension is the dominant influence in regulating both the tone of the cerebral blood-vessels and the activity of the respiratory centre over the ordinary physiological range. If this is so, the regulation of the cerebral circulation is fundamentally a simple affair. Given the requisite head of pressure, the blood-flow through the brain is controlled by its metabolic needs of the moment; and this presumably applies as much to local areas as to the brain as a whole. This dependence of the brain upon the systemic blood-pressure involves, of course, a considerable degree of central control over it, exerted not only through the response of the vasomotor centres to changes in their own blood-supply, but also by means of such mechanisms as the carotid-sinus reflex. How closely the blood-flow through the brain is regulated, even in some pathological conditions, is illustrated by what happens in hypertension. Kety et al. (1948) have shown that in patients with simple hypertension the cerebral blood-flow, the oxygen consumption of the brain, and the arteriovenous oxygen difference are all normal. This is brought about by a concomitant increase in cerebral vascular resistance equal to the elevation in mean blood-pressure. Conversely, Dewar, Owen, and Jenkins (1953) found that hexamethomium given to hypertensives did not lower the cerebral blood-flow; but this may not be true of patients with premalignant or malignant hypertension (Crumpton, Rowe, Capps, Whitmore, and Murphy 1955).

The Anatomical Contribution to Regulation of the Cerebral Circulation

The peculiarities of the regulation of the cerebral circulation must be to some extent dictated by the fact that the brain is contained within the skull, which functions for all practical purposes as a rigid box. Since the contents of the cranial cavity must remain virtually constant, this must materially limit the range of both expansion and contraction of the cerebral vessels. If the total volume of the blood in the brain increases it can do so only at the expense of the volume of the nervous tissue itself, or of the cerebrospinal fluid, or both. It seems likely that the histological structure of the cerebral arteries is related to the method of regulation of the cerebral circulation already described. Their histological peculiarities are evident at the point of transition from their extracranial to their intracranial course—namely, the prominent internal elastic lamina, in which they resemble the coronary arteries, and the paucity of elastic fibrils in the media and adventitia. It has been argued by Wolff (1938) that the effect of the well-developed elastic internal lamina is to damp down the pulsation of the vessels, and it is obvious that in the closed box of the skull these could occur only at the expense of the surrounding brain tissue. One may suppose that in the circular muscle fibres of the media, so poor in elastic tissue (as already mentioned), resides the tonic function of contracting in response to internal stress—for example, a rise of blood-pressure—a point which will be discussed later. One of the striking features of the cerebral vascular supply which has been revealed by angiography is the tortuous intracranial course of the internal carotid artery, known as the carotid syphon. There is a somewhat similar loop to be seen in the vertebral artery in its course between the atlas and the foramen magnum, and these curvatures at the approach of the arteries to the brain may well serve also to damp down the transmitted arterial pulse. And we must remember that the pulsation of the brain which we see at an operation when part of the skull has been removed is artificial, and due to the disappearance over that area of the rigidity of the cranial box.

The Circle of Willis

Ever since its discovery in the 17th century, the circle of Willis has attracted attention, perhaps because of its uniqueness in the circulatory system. The linking of the four arteries which supply the brain—the two internal carotids and the two vertebrals—has presumably some biological function. McDonald and Potter

* Harvey Tercentenary lecture delivered to the Harveian Society on March 27, 1957.

(1951) have made a study of the cerebral circulation in the rabbits, in which the disposition of the cerebral arteries is similar to that seen in man. Their observations show that the internal carotid artery and the basilar artery share the blood supply to each cerebral hemisphere in such a way that there is normally no interchange of blood between them. The opposing streams of the two arteries meet in the posterior communicating artery at a "dead point," at which the pressure of the two is equal. Consequently they do not mix there. Similarly the territories of the two internal carotid arteries meet at a "dead point" in the middle of the anterior communicating artery (fig. 1). If, however, both internal carotids or both vertebral arteries are occluded, blood passes forwards or backwards respectively from the pair which are still patent. There is then a functioning antero-posterior anastomosis in each posterior communicating artery. Similarly, occlusion of one internal carotid artery leads to its territory's being invaded by the basilar supply through the posterior communicating artery, and from the opposite internal carotid through the anterior communicating artery. The latter can readily be demonstrated in the course of angiography; for when the opaque medium is injected into one carotid, and the opposite one is compressed, it normally crosses the middle line through the anterior communicating artery; but this does not happen if the normal flow through the uninjected carotid is allowed to continue.

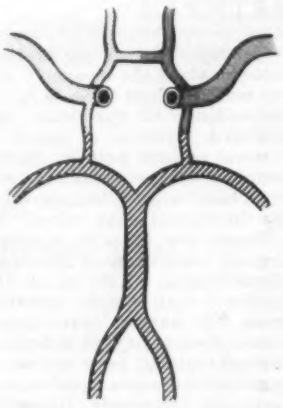

Fig. 1—Areas of distribution of the interior carotid arteries and the basilar artery within the circle of Willis in a state of equilibrium between them.

Comparative anatomy shows that the circle of Willis is a specialisation of the primitive arterial network seen, for example, in the frog. Reptiles have formed separate anterior, middle, and posterior cerebral arteries from the arterial network. In lower mammals the cerebral arteries have to cope with the demands of the growing neopallium, and the dorsoposterior expansion of the cerebral hemispheres causing the posterior cerebral artery to employ successively posterior stems of origin until it receives its blood through anterior mid-brain channels and eventually becomes linked up with the enlarged basilar artery. The posterior communicating artery, which runs from the internal carotid to the basilar, is what remains of what was originally the caudal division of the internal carotid. Human embryonic development recapitulates this (Padget 1944), and the embryonic state may persist, as in the patient shown in fig. 2 whose angiograms show a large carotico-basilar anastomosis on the right side only. Anteriorly the anterior communicating artery may unite to form a single trunk, or, as in man, remain separate, being linked by the anterior communicating artery. (Abbie 1934).

The form taken by the circle of Willis in the monkeys and primates has been studied by Watts (1934). The arrangement of the cerebral arteries in the gorilla and in the orangutan resembles that in man. The chimpanzee has only a single anterior cerebral artery, while the black-face spider monkey has a double basilar artery, the persistence of an early embryonic condition. The relative importance of the carotids and the vertebrals varies greatly in different species. In the lemur the

Fig. 2—*On the left:* **right carotid angiogram, lateral view, showing a persistent carotico-basilar artery.** *Right:* **antero-posterior view of the same, showing that the abnormal vessel supplies both posterior cerebral arteries. The left carotid angiogram was normal. Angiograms by Dr. D. Sutton.**

vertebrals supply almost the whole of the blood going to the brain and the carotids are rudimentary: in man the two are of approximately equal importance.

I shall discuss later the importance of the circle of Willis in disease of the cerebral arteries. The clinician is apt to look upon it as a device for maintaining as adequate as possible a blood-supply to the brain in the event of one of the main vessels being blocked; but it can hardly have been evolved to that end. Why, then, is it that in all species we find a vascular device by which the blood can readily flow in any direction in order that its supply to the brain may be freely maintained? The biological dangers of even brief cerebral ischæmia are obvious: an adequate supply of blood to the brain must have the highest possible survival value. Surely the purpose served by the circle of Willis is to guarantee that whatever the position of the head in relation to gravity and to the trunk, and however from one moment to another the relative flow through either carotid or vertebral artery may vary as a result, these variations are always compensated for distal to those vessels, and within the cranial cavity, by the freest possible anastomoses before the brain is reached. Hence, the scheme which partitions the circle of Willis symmetrically between the areas of supply of the various vessels with "dead points" between them is an abstraction, true only when the head is maintained in a certain position of rest, and perhaps not always even then. In the living animal in constant movement the tides of the blood ebb and flow from moment to moment to achieve the sovereign purpose of making available a constant supply to every part of the brain.

Other Collateral Channels

Other collateral channels must now be considered. We have become so accustomed to the human arrangement of the blood-vessels of the head and neck that we are apt to take for granted the fact that in man no substantial anastomosis between the internal and external carotid arteries exists. Comparative anatomy, however, shows that this is a highly specialised arrangement, and the existence of important anastomotic channels between the two in many animals is not merely of academic interest, as we shall see when we come to consider the effects of cerebral vascular occlusion in man.

Legait (1947) points out that three main morphological types of vascular arrangement with transitional forms are found in the mammals. In man and the horse the brain is supplied mainly by the vertebral arteries and the internal carotids, the latter penetrating the cavernous sinus. In the cat the vertebral, internal carotid, and internal maxillary arteries supply the brain, the two latter anastomosing in the region of the cavernous sinus. In the Bovidæ and Suidæ the internal carotids function only in the embryo, and later blood is supplied only by the internal maxillary arteries (which join the rete mirabile derived from the carotid) and to a lesser extent by the vertebral and occipital arteries. Boissezon (1941, 1942) has studied the rete mirabile in the sheep. Having been formed in the way already mentioned, it gives off an efferent vessel which passes through the dura mater and supplies the brain in a similar manner to the internal carotid in other mammals. In such animals there is no carotid sinus and it appears that the rete mirabile acts in some way as a regulator of the cerebral circulation. The carotid rete and its associated arteries have been studied also by Daniel, Dawes, and Prichard (1953).

Phylogenetically speaking, the eye and the orbit, as Wolff points out, have long been the common meeting-ground of the intracranial and extracranial circulations. In some animals, for example the sea-lion, the main supply of blood comes from a well-developed internal maxillary branch of the external carotid. In the tiger also it comes from the internal maxillary, but here a small internal carotid contributes some blood and is connected with the internal maxillary through a vascular plexus. In the civets a branch from the internal maxillary unites with a branch from the internal carotid to supply the orbit. In the marmot the state of affairs closely approaches that found in man: the stapedius artery arising from the internal carotid is the main source of supply to the orbit, but it is joined by an anastomotic branch from the internal carotid which in man becomes the ophthalmic artery.

Thus, from a phylogenetic standpoint, why one arrangement should have been selected rather than another is by no means obvious. Nevertheless, as Lamberton (1947) has pointed out, the calibre of the internal carotid becomes relatively larger as one proceeds from the lemurs to lower monkeys and further to the anthropoid apes, and is largest in man. Clearly the regulation of the cerebral circulation in animals which have important anastomoses between the external and internal carotid arteries must be substantially different from that in man. Thus, Bouckaert and Heymans (1935) have shown that in the dog, in which this occurs, the anastomosis connecting the external and internal carotids through the ophthalmic artery will keep the central nervous system alive when all other blood-supply to it is occluded. Clamping the internal maxillary artery causes an increased blood-flow through the internal carotid. In such animals a discharge of vasoconstrictor impulses through the cervical sympathetic to the head must have quite a different effect from what happens in man, and the different organisation of the human cerebral blood-flow may explain why neurogenic vasoconstriction of the cerebral vessels seems to be relatively unimportant.

Perhaps the most entertaining example of evolutionary adaptability in the cerebral circulation is that described in the giraffe by Lawrence and Rewell (1948). In this animal the external carotid artery which connects with the rete mirabile has no connection with the vertebral artery, but the blood can be shunted from the rete through the occipital and another vessel, which is probably homologous with the internal carotid artery, into the vertebral artery when the animal lowers its head. The length of the giraffe's neck necessitates a high blood-pressure to maintain its cerebral circulation. Patterson et al. (1957) found a normal range between 282/158 and 344/194. The giraffe, therefore, possesses a shunt mechanism which is an adaptation to its long neck and adjusts the cerebral blood-flow to changes of posture in relation to gravity.

But, besides the elaborate and varied arrangements of the rete mirabile and the circle of Willis, there is a further set of distal anastomoses described by Beevor (1909), Shellshear (1927) and Abbie (1934). Abbie writes:

> "Shellshear has shown that the three major arteries (i.e., the anterior, middle and posterior cerebrals) always anastomose at the periphery of their cortical fields of supply. His lines of vascular demarcation are too well known to require further discussion. To this may be added that there is no such thing as a non-anastomotic artery on the surface of the brain although the anastomoses are not always sufficiently large to compensate for occlusion of some of them. Every vessel joins another and the primitive network whence they have all arisen remains intact. No cerebral artery becomes an end-artery until it has entered the brain substance, but once within the brain no artery appears ever to join another. When it enters the brain its distribution is fixed and it proceeds alone to the destination which has been its own ever since that part of the brain first appeared."

Conclusions on Blood-supply

To sum up our conclusions thus far, the blood-supply to the brain depends directly upon the systemic blood-pressure, and inversely upon the resistance offered by the cerebral vessels, and normally these are mutually

adjusted in various ways to maintain the optimum supply of blood to the brain. Anatomically the circle of Willis stands on the four legs of the two carotid and two vertebral arteries, and its branches the anterior, middle, and posterior cerebral arteries intercommunicate where their cortical territories meet.

Cerebral Ischæmia due to Atheroma

Let us now apply these principles to the interpretation of some disorders of the cerebral circulation, beginning with cerebral ischæmia due to atheroma.

The striking feature which emerges from the recent increase in our knowledge of the cerebral circulation is the complexity and the multiplicity of the factors concerned—in other words the number of variables.

Local Vascular Narrowing

The first and most obvious factor is local narrowing of a vessel due to atheroma; but atheroma does not always give rise to narrowing—it may cause dilatation. Does spasm of the cerebral vessels ever give rise to symptoms? Though the older clinicians attached some importance to spasm, I am sure that many transitory ischæmic episodes can be explained without recourse to this hypothesis. Nevertheless, carotid angiography has demonstrated that under these artificial conditions severe spasm of the internal carotid artery may occur. Hence we cannot rule out the possibility that the same thing may happen as the result of irritative pathological lesions, and it seems certain that some symptoms which result from rupture of an intracranial aneurysm are due to spasm of an adjacent artery.

The Collateral Circulation

The collateral circulation exists at three levels: (1) at the level of the supply to the circle of Willis (i.e., in the carotids and the vertebro-basilar system); (2) in the circle of Willis itself; and (3) where the territories of the anterior, middle, and posterior cerebral arteries meet. When the collateral circulation is good, a major vessel, such as one internal carotid artery, may be completely occluded without any symptoms resulting. I once saw a man aged 43 who had been admitted to hospital because of slight aphasia associated with weakness of the right upper limb, both of which were improving. A left carotid angiogram showed the vessel to be completely obstructed. A right carotid angiogram showed the right internal carotid to be completely obstructed also. There had never been any symptoms of this, and this patient was supplying the whole of his cranial contents from the two vertebral arteries, with very little disability. If, however, more than one main artery to the brain is partially obstructed, the circulation may remain sufficient to prevent the development of symptoms until one becomes completely obstructed, when the inadequacy of the other also becomes manifest, and widespread ischæmia may result. Hutchinson and Yates (1956, 1957) have recently demonstrated this mutual relationship between the internal carotid and the vertebral arteries. A patient with atheromatous narrowing of both these vessels on one side may remain free from symptoms until the internal carotid becomes completely occluded when infarction not only of the ipsilateral cerebral hemisphere but also of the ipsilateral cerebellar hemisphere occurs, because the blood-supply through the narrowed vertebral artery is now insufficient to maintain its nutrition. These authors rightly point out that what they term the carotico-vertebral system should be regarded as a unity.

In the circle of Willis the collateral circulation depends on the absence not only of atheromatous narrowing, but also of congenital insufficiency of the vessels composing the Circle (Fetterman and Moran 1941, Padget 1944). Such congenital anomalies are not uncommon and a thread-like posterior communicating artery, for example, may render the collateral circulation inadequate. Similar variations are also encountered in the size of the vertebral arteries. The effectiveness of the collateral circulation between the terminal branches of the anterior, middle, and posterior cerebral arteries must also play its part in influencing the size of the area of infarction resulting from obstruction of one of them.

Influence of the Systemic Blood-pressure

Since the systemic blood-pressure is the dynamic source of the cerebral circulation, variations in it are bound to affect the blood-flow through the brain when, for pathological reasons, they cannot be compensated for. Hence, when there is atheromatous narrowing of a cerebral artery a fall in the blood-pressure may cause either transitory symptoms of cerebral ischæmia, or permanent symptoms due to actual cerebral infarction. Confining an elderly person to bed for any reason may precipitate cerebral infarction; so may hypotension induced for surgical purposes. Myocardial infarction may operate either by lowering the blood pressure or by leading to a cerebral embolus. The blood changes produced by mercurial diuretics may also precipitate a stroke in an atheromatous patient.

A fall in cerebral blood-flow probably explains why a patient suffering from atheroma of one internal carotid artery is most likely to experience symptoms of cerebral ischæmia on awakening in the morning, or on rising from the supine to the erect posture, and why the more serious attacks of cerebral vascular occlusion so often occur during sleep. A sudden fall in the systemic blood-pressure from any cause is probably the commonest cause of syncope. The cough syncope, typically seen in elderly men with emphysema, has I suspect a more complex ætiology. In such patients the changes in intra-thoracic pressure, associated with coughing, interfere with the return of blood through the great veins to the heart and hence its delivery to the brain. But such patients also usually have some degree of atheroma of the cerebral arteries which renders them abnormally intolerant of a fall of blood-pressure.

Intermittent Cerebral Ischæmia

Transitory attacks of ischæmia of part of the brain are a prominent symptom of atheroma of the cerebral arteries. They may precede a stroke, or follow partial recovery from one, or occur for a long time as the sole manifestation of the impaired circulation. We still do not know for certain how they are caused, nor, indeed, whether they are caused in only one way. It seems likely that when, owing to narrowing of a vessel, the blood-supply to the part of the brain which that vessel provides is normally only just adequate, it will rapidly become inadequate if the systemic blood-pressure falls, or if for some reason there is a local diversion of blood from that part of the brain. Though some have held that ischæmic attacks may be due to small cerebral emboli derived from a mural thrombus in the narrowed part of the vessel, deficiency of blood-supply seems the best explanation of the transitory attacks of unilateral amblyopia often encountered in patients with atheroma of the internal carotid artery. These must surely be due to a temporary fall of blood-pressure in the ophthalmic artery. Why, then, does the eye so rarely become permanently blind when the internal carotid is completely occluded? Symonds (1955) has plausibly suggested that in most cases a collateral circulation to the orbit via the external carotid and internal maxillary arteries becomes established in time to maintain the blood supply to the eye and so save the vision. How effective this collateral circulation can be is shown in fig. 3—a carotid angiogram performed ten years after ligature of the internal carotid. The cerebral circulation is filled through the external carotid as rapidly as normally, though less completely.

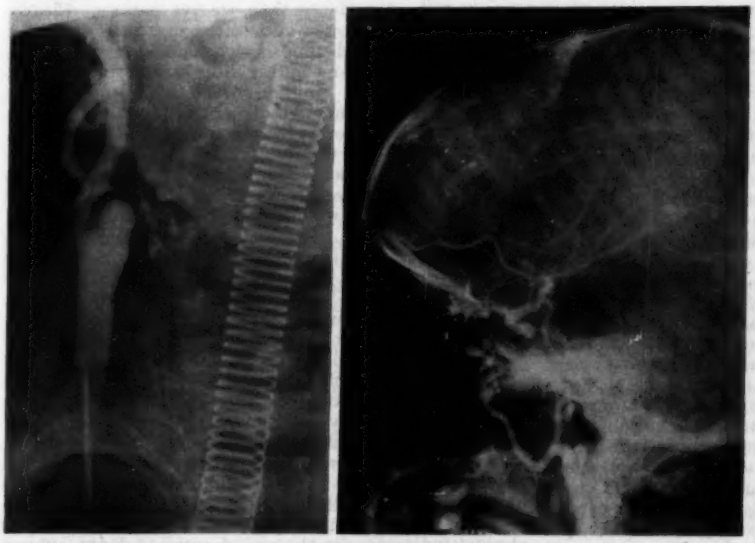

Fig. 3—Carotid angiogram ten years after ligature of the internal carotid. *Left:* stump of internal carotid. *Right:* cerebral circulation filled through external carotid. (Angiogram by Dr. Sutton.)

The symptoms of transitory ischæmia of one cerebral hemisphere resulting from atheroma of the internal carotid artery are too familiar to need more than a brief mention. They include periods of mental confusion with subsequent amnesia, generalised or focal epileptic attacks (though in my experience these are not very common), transitory numbness or tingling or weakness of one or other limb on the opposite side, or of a hemiplegic distribution, and, when the left hemisphere is involved in a right-handed person, transitory aphasic attacks of various kinds. Attacks of myoclonic twitching of a limb are fairly common after a stroke, and usually involve the lower limb, being particularly troublesome at night. It is tempting to explain these in terms of fluctuations of the collateral circulation to the leg area of the cortex on the damaged side from the opposite internal carotid artery via the anterior communicating artery.

Headache is sometimes a prominent symptom of atheroma of the internal carotid. It may be a prodromal symptom preceding a more serious disability, such as a stroke. It is common immediately after a stroke and it sometimes persists for long periods and is extremely troublesome. Symonds has suggested that it is often due to dilatation of collateral vessels, and this seems very probable. If so, at least two sources of the headache can, I think, be distinguished. The commoner type of headache probably arises from dilatation of the vessels of the circle of Willis, but there is another kind of headache somewhat resembling migraine and associated with dilatation and increased pulsation of the branches of the external carotid artery.

Vertebro-basilar Ischæmia

Recognition of the symptoms of ischæmia within the distribution of the vertebro-basilar supply lags behind that of the symptoms of internal carotid atheroma. The two may sometimes be difficult to distinguish, and the symptoms of vertebro-basilar ischæmia are more likely to be taken for those of carotid ischæmia than the reverse. Since the supply to the posterior cerebral arteries normally comes from the basilar artery, vertebro-basilar atheroma may cause ischæmic disturbances of one or both temporal and occipital lobes. The symptoms of these include attacks of confusion and disorientation, impairment of memory which may amount to severe and persistent memory loss, defects of the higher visual functions, teichopsic attacks reminiscent of migraine, transitory or permanent hemianopia, or even complete cortical blindness. Impairment of blood-supply to the brain-stem and cerebellum may lead to a wide variety of symptoms, such as diplopia, dizziness, and unilateral, crossed, or bilateral numbness or weakness, dysarthria, and ataxia of the limbs (Millikan and Sieckert 1955). Headache when present is most likely to be occipital.

Ancillary Diagnostic Aids

The impairment of the blood-supply to the eye resulting from atheroma of the internal carotid artery has recently been employed as a diagnostic test. By using a measured pressure upon the eye it may be shown that the blood-pressure in the central retinal artery is lower upon the affected than upon the normal side (Milletti 1950, Svien and Hollenhorst 1956). Examination of the cerebrospinal fluid often gives useful information. For two or three weeks after a recent cerebral infarction the fluid is likely to have a raised protein and may be xanthochromic. There is often a moderate excess of cells of which a minority may be polymorphonuclears. When there is no reason to suspect infection, the presence of a few polymorphonuclear cells in the cerebrospinal fluid is a useful indication of recent brain damage of vascular origin.

In cases of atheroma of the internal carotid artery electro-encephalographic abnormalities are commonly found over some part of the affected cerebral hemisphere. Webster, Gurdjian, and Martin (1955) and Gurdjian, Webster, and Martin (1957), discuss the diagnostic value of carotid compression in the neck.

Palpation of the carotids should always be carried out. Sometimes it is easy to be sure that there is a difference between the two sides, but this is a test which is often difficult to interpret. Auscultation occasionally reveals a bruit which may be heard either in the neck or on listening over the eye, and is presumably due to narrowing of the internal carotid.

Cerebral angiography may give valuable information. Some hold that it is best avoided as liable to produce a cerebral vascular accident when used in cases of carotid atheroma, especially perhaps when accompanied by hypertension. Most workers who use it regularly, however, regard such risks as slight, and it would seem justifiable to use carotid angiography when it can provide information which could not be obtained in any other way and which may be essential in order to decide what treatment to adopt. It has been suggested that surgical exploration of the vessel is less risky and can provide as much information. Only angiography, however, can tell us what is happening in the intracranial course of the vessel and its branches, when the obstruction is not in the neck.

In patients with vascular disease vertebral angiography by the method of direct puncture is certainly more risky than carotid angiography, and it should therefore be used with caution in such cases.

Some Problems of Treatment

In the past our attitude to cerebral infarction, threatened or actual, has been largely fatalistic. Even today the limitations of treatment are all too obvious. Nevertheless, we have a much greater understanding than before of the factors involved, and we can therefore see more clearly what should be the aim of treatment even if the value of particular methods is often still sub judice.

Early diagnosis, based upon the recognition of the significance of early symptoms and signs, aided when necessary by special diagnostic methods, is likely, as our methods of treatment improve, to make it increasingly possible to avert, or at any rate postpone, the more serious effects of atheroma of the cerebral vessels.

When once an ischæmic stroke has occurred, whether major or minor, it should be borne in mind that the degree of recovery will often depend upon the extent to which a collateral circulation can be established, particularly to what may be termed marginal areas. This in turn will depend upon a patency of the collateral channels, the height of the systemic blood-pressure, and the adequacy of the blood itself in respect of oxygen and nutrients, particularly vitamins. Although bed rest will be essential during the stage of shock, or coma, and in the case of patients too severely disabled to sit up, the aim should always be to get the patient to move his sound limbs and to sit out of bed as soon as possible. This is particularly important in the case of non-hypertensive patients, since immobilising them may lead to a fall of blood-pressure which will militate against the establishment of a good collateral circulation.

It is doubtful whether any vasodilator drug dilates the cerebral vessels. Aminophylline is sometimes used for this purpose, but such evidence as there is suggests that it may have a vasoconstrictor action on the vessels of the brain (Kety 1950). If we bear in mind the relationship between the cerebral circulation and the systemic blood-pressure it is clear that vasodilator drugs which do not dilate the cerebral blood-vessels may indirectly impair the cerebral blood-flow by lowering the systemic blood-pressure.

A similar caution applies to the use of hypotensive drugs. Dewar, Owen, and Jenkins (1953) have shown that hexamethonium does not lower the cerebral blood-flow. This is because, when the blood-pressure falls as the result of giving hexamethonium, there is a corresponding increase in the calibre of the cerebral vessels. These authors, however, point out that if the mean cerebral flow does not alter there will be a slowing of the linear flow rate and a prolongation of the local circulation time. If, therefore, this is already below normal, owing to atheroma of a vessel, the use of such a drug as hexamethonium, although it does not diminish the cerebral blood-flow as a whole, may increase the risk of local thrombosis. Hence, before using such drugs in the treatment of hypertension, it is important to look for evidence of cerebral vascular disease in the history and clinical condition of the patient.

Cervical sympathetic block has had a certain vogue in the treatment of cerebral infarction. If the cerebral vessels in man have no important vasoconstrictor nerve-supply it is difficult to see how sympathetic block could directly improve the blood-flow through the brain. If, however, in any individuals the collateral circulation through the external carotid is of any magnitude, it might presumably be improved by interrupting the vasoconstrictor fibres to it through the cervical sympathetic. The prognosis of untreated cerebral ischæmia is so extremely variable that it is very difficult to assess the significance of the improvement which it has been claimed may follow cervical sympathetic block.

The value of anticoagulants, and hence the indications for their use, are also debatable. Here again we need more statistical evidence than we yet possess. Clearly the first diagnostic essential is to be sure that the lesion with which we are dealing is ischæmic and not hæmorrhagic. Even so, immediately after an ischæmic stroke, there is an area of brain in which the capillaries are damaged. There is undoubtedly a risk that anticoagulants may lead to a hæmorrhage into such an infarcted area. Since it is doubtful whether they will in other respects do good it would seem unwise to give anticoagulants within at least three weeks of an attack of cerebral infarction. Some would use the cerebrospinal fluid as a guide in such cases and withhold anticoagulants as long as the fluid is xanthochromic. The level of the blood-pressure must also presumably be relevant to the risk of hæmorrhage. The selection of an upper limit must necessarily be somewhat arbitrary, but most workers would regard a severe degree of hypertension as in itself a contraindication to the use of anticoagulants.

The most plausible argument for the use of anticoagulants is in patients with cerebral atheroma who suffer from transitory ischæmic attacks which are rightly regarded as a warning that a more severe occlusive lesion may occur. Several American workers have claimed that after being put on anticoagulant therapy patients have much fewer ischæmic attacks than before, though there is no adequate explanation of this fact. The clearest indication for the use of anticoagulants, subject always to the precautions I have already mentioned, is perhaps in those patients whose ischæmic attacks indicate atheroma of the vertebro-basilar system, since the prognosis in such cases is always grave, and there is some evidence that it is considerably better in those treated with anticoagulants (Millikan, Sieckert, and Schick 1955).

Finally, a word or two about arterial surgery. Since the commonest site of narrowing by atheroma of the internal carotid artery is just above the bifurcation of the common carotid, the early recognition of this lesion may render it amenable to surgery, and, even when the vessel at that site is completely occluded by a thrombus, it may be patent more distally, and the removal of the obstruction may enable the cerebral blood-flow through that vessel to be re-established. Here is a promising method of treatment which will obviously be particularly valuable for patients who happen to have a localised lesion (Rob and Wheeler (1957)).

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UNUSUAL OUTBREAK OF STAPHYLOCOCCAL POSTOPERATIVE WOUND INFECTION

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AN outbreak of postoperative sepsis, with serious consequences, apparently arose from a small furuncle on a surgeon's forearm. Such an origin is either uncommon or unrecognised, and the events which were finally revealed by our investigation could very easily have passed without notice. We should not indeed have recognised them if a special survey of wound infections had not been instituted in the unit concerned, and if we had not been phage-typing all staphylococci sent to us from the routine bacteriology of a number of hospitals in the area.

Clinical Record

In the surgical unit concerned, a survey of wound infections had recently been begun—not because of any suspicion that the incidence was high but to ascertain what exactly it was. The sepsis-rate was in fact very low, but it rose suddenly when within 8 days four patients developed postoperative infections. Case 1 had a superficial wound infection which was present at the time of first dressing on the 7th postoperative day. Cases 2, 3, and 4 had deep wound abscesses which discharged on the 11th, 8th, and 15th postoperative days respectively. These three wounds had appeared satisfactory at the time of first dressing. The pus examined from these four infected cases yielded a pure growth of coagulase-positive staphylococci with a notably greyish-white pigmentation. This cultural character was important, because it led to the discovery of a hitherto unrecognised case in the outbreak (case 5).

One of our colleagues who had examined postmortem specimens from case 5 (of fatal peritonitis) commented on the unusually white appearance of the coagulase-positive staphylococci isolated from the peritoneal pus. We then discovered that the patient had recently had a gastroenterostomy in the unit whose outbreak we were investigating.

The postoperative course had been complicated by abdominal distension, vomiting, and pyrexia. On the 6th postoperative day the patient collapsed with peripheral circulatory failure and a foul-smelling fatty fluid was discharged from his wound. Despite administration of intravenous fluids and erythromycin, he died later on the same day. At necropsy a collection of pus and clear yellow fluid was found in the peritoneal sac in the deep aspect of the surgical incision. There were also signs of generalised fibrinous peritonitis. There was no leakage from the anastomosis. Coagulase-positive staphylococci were obtained in pure culture from the peritoneal pus and isolated from the spleen and contents of jejunum and rectum. Histological sections showed clumps of gram-positive cocci in the exudate on the peritoneal surface of the intestine.

At this point it struck us that another patient (case 6) from the same unit had died a fortnight earlier in similar circumstances.

This patient developed severe abdominal distension after partial gastrectomy. His wound began to discharge, and coagulase-positive staphylococci, *Escherichia coli*, and enterococci were isolated from the pus. In spite of treatment his condition deteriorated; the possibility of a leak from the anastomosis was suspected, so he underwent a second operation. No leak was found, but there were signs of plastic peritonitis in the stages of resolution. No specimens were taken for bacteriological examination. He died a few hours later, and necropsy confirmed the findings recorded at the second operation. Fortunately the staphylococci cultured from the wound of the first operation were available for further investigation.

In each case the site and character of the infection suggested that it had been acquired at operation, and review of the operating-theatre lists showed that all the six infected patients had been operated on by surgeon A. In operations undertaken by surgeon A during a period of 15 days (table) only two of his eight patients escaped staphylococcal wound infection. Two cases with which he assisted during this period also remained free from infection. It then came to light that surgeon A had been operating during this time with a small furuncle on his forearm. This lesion caused little pain or discomfort, and no systemic disturbance. It measured about $^1/_8$ in. in diameter, and was on the ulnar aspect of his right forearm above the glove but where the gown sleeve might become wet. While the furuncle was discharging, the surgeon had taken the precaution of covering it with a waterproof dressing. When we saw it 3 weeks later the lesion was crusted over and almost, though not completely, healed. From a broth-soaked swab rubbed over the area, a scanty growth of coagulase-positive staphylococci was obtained. A second swab taken 6 days afterwards yielded a very scanty growth of the organism, but subsequent swabs were negative. Routine nasal swabs taken from surgeon A a month before the outbreak and twice during the investigation did not yield coagulase-positive staphylococci. The point of interest to us is that the presence of the furuncle and its relation to the outbreak were discovered only because the recently instituted wound-infection survey revealed a sudden change in the previously low sepsis-rate, and the phage-typing disclosed an epidemic type of staphylococcus whose origin we felt bound to investigate with a good deal of persistence.

The staphylococci isolated from each of the six patients and from surgeon A's furuncle all had the characteristic greyish-white colonial appearance already mentioned and were found to be the same phage type—namely, 52A/79. This strain had not been isolated from any wound

SEQUENCE OF EVENTS IN AN OUTBREAK OF POSTOPERATIVE WOUND SEPSIS. THE NUMBERS ASSIGNED TO THE CASES REVEAL THE ORDER IN WHICH THEY BECOME KNOWN

Day no.	State of furuncle on Surgeon A's arm	Surgeon A's operating-lists	Postoperative course
1	First noticed by surgeon	None	—
		CASE 6	
2	—	Partial gastrectomy	Wound abscess: *Staph. pyogenes* type 52A/79
		Cholecystectomy	Uneventful
4	Discharged	Prostatectomy	Wound infection; coliforms
		CASE 6	
9	—	Second operation	Patient died with peritonitis after operation
		CASE 2	
10		Partial gastrectomy	Deep wound abscess; *Staph. pyogenes* type 52A/79
		CASE 1	
		Polya → Billroth conversion	Superficial wound infection; *Staph. pyogenes* type 52A/79
		CASE 4	
		Cholecystectomy	Deep wound abscess; *Staph. pyogenes* type 52A/79
		CASE 5	
15		Gastroenterostomy	Patient died on 6th postoperative day with peritonitis; *Staph. pyogenes* type 52A/79
		CASE 3	
		Polya → Billroth conversion	Deep wound abscess; *Staph. pyogenes* type 52A/79
18	—	Laparotomy	Uneventful
24	First swab taken from almost healed lesion. *Staph. pyogenes* type 52A/79 (scanty growth)	Partial gastrectomy	Uneventful
		Cholecystectomy	Uneventful
		Removal of thyroid cyst	Uneventful

in the unit in the previous 6 months. Nasal swabs from surgeons and theatre nurses showed that seven of eleven carried coagulase-positive staphylococci. Phage-typing showed these strains to be different from each other and from the epidemic strain with one exception—namely, that one surgeon carried in his nose a strain of type 52A/79 which gave a well-marked golden pigment. This surgeon had no contact with any of the infected cases. While infected cases were still in the wards, one of the house-surgeons developed a boil on his neck. Several weeks later, when the incident was apparently ended, two patients developed superficial wound infections after first dressings. Type 52A/79 with greyish-white pigmentation was isolated from these infections. These three incidents, which were probably due to ward cross-infection, are the only evidence of subsequent spread of the epidemic strain in the unit. Three and a half months after the first operation the patient of case 1 developed a deep stitch abscess requiring operative treatment. The patient of case 2 was readmitted for a repair of an incisional hernia 4 months after the original operation. A wound abscess developed after this second operation, which was not carried out by surgeon A. A growth of staphylococci of type 52A/79 of greyish-white pigmentation was cultured from both of these lesions.

Discussion

Staphylococcal wound sepsis acquired in the operating-theatre has aroused much interest in recent years (Clarke 1957), and many possible sources of infection have been described. Devenish and Miles (1939) showed that a surgeon who carried staphylococci on his skin could contaminate wounds through glove punctures. Such a carrier was the probable source in an outbreak described by Shooter et al. (1957). Harrison and Cruickshank (1952) found that staphylococci from the patient's skin could cause infection when preoperative skin preparation was inadequate. The importance of dust-contaminated air entering the theatre from the hospital corridors has been emphasised by Bourdillon and Colebrook (1946), Blowers et al. (1955), and Shooter et al. (1956). Few workers have mentioned the dangers of a surgeon's operating while he has a septic lesion, though this was emphasised in the Medical Research Council War Memorandum no. 6 (1941). We have been unable to find reports of any outbreaks with such an origin.

Coburn (1944), studying the epidemiology of *Streptococcus pyogenes*, came to the conclusion that when this organism was derived from subacute infections it might be more communicable than when it was derived from a healthy mucous membrane. Barber and Burston (1955) suggested that this might be true for coagulase-positive staphylococci. Investigating staphylococcal cross-infection in a maternity unit, they noted that, despite a high nasal-carriage-rate among patients and staff, infections were few and trivial until a nurse came on duty with a boil on her face. Within a few days, one baby had acute mastitis—a much more serious infection than any seen previously during the study—and another had conjunctivitis.

In the present outbreak unusually severe infections developed in six patients after operations performed by a surgeon who had a furuncle on his forearm. Three patients had deep abscesses, necessitating a long stay in hospital, and two died. In one of the two fatal cases, the cause of death was staphylococcal peritonitis. The other patient died in similar circumstances, and though the evidence was incomplete, there can be little doubt that staphylococcal infection contributed to his death. It is interesting that this patient underwent operation before the furuncle discharged, and that the other patients became infected though the lesion was covered with an occlusive dressing.

To emphasise that there may be difficulty in detecting epidemics of wound infection, as well as in finding their origin, we have described the events in the sequence in which they became known to us. Other similar outbreaks may well have occurred without their existence or source being recognised. Staphylococcal skin infections are common, especially perhaps in hospital staff. Because of the mildness of the associated systemic illness, few surgeons with skin infections are willing to forgo operating. We have shown that covering the lesion may not prevent fatal infection. We conclude that the risk of dangerous contamination is so great that no surgeon should operate with a staphylococcal infection of the arms or hands.

Summary

An outbreak is reported of postoperative staphylococcal wound infection, involving six patients, two of whom died.

The source of infection was a furuncle on the arm of the surgeon.

We should like to thank Mr. D. B. Colquhoun for his assistance in phage-typing, and Dr. R. E. O. Williams and Dr. Joan E. Rippon for teaching one of us (M. C. T.) the technique of phage-typing.

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OLIGURIA WITH URINE OF "FIXED" SPECIFIC GRAVITY

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OBSERVATION of the specific gravity of the urine is of great importance in the assessment of renal function, particularly in the early recognition of acute renal failure. In the 48 hours following some insult likely to be complicated by renal damage—e.g., mismatched blood-transfusion, severe hæmorrhage, or an episode of hypotension—oliguria may suggest renal damage. In the absence of glycosuria or very heavy proteinuria, oliguria with urine of a specific gravity exceeding 1020 is due, not to acute renal damage, but to prerenal factors. In similar circumstances, the finding of a urinary specific gravity not exceeding 1014, with a total 24-hour urine output of 720 ml. (30 ml. an hour) or less, implies acute renal failure (assuming previously normal function). A 24-hour urine volume of less than 720 ml. is arbitrarily taken as oliguria.

Oliguria with urine of "fixed" specific gravity (1008–1014) is the most important point in the early diagnosis, and therefore correct management, of acute renal failure. The blood-urea or non-protein nitrogen may rise to the same extent with "prerenal failure" as with severe renal damage during the first 48 hours. Occasionally, however, oliguria with urine of "fixed" specific gravity is not an indication of renal failure.

The solute concentration of the urine depends on the solute excretion-rate and urine volume. We know of no data

TABLE I—TOTAL OSMOLAR EXCRETION PER 24 HOURS DURING THE DAY (8 A.M. TO 11 P.M.), AND DURING THE NIGHT (11 P.M. TO 8 A.M.)

Period	24 hours			Day			Night			
Subject	A.M.J.	K.D.	J.F.M.	A.M.J.	K.D.	J.F.M.	A.M.J.	K.D.	J.F.M.	
Excretion (m.osm. per period)	890	857	942	678	485	566	212	372	376	Control
	1168	923	966	884	711	584	284	212	220	Control
	1006	980	1017	730	660	518	276	320	239	Control
	801	562	597	635	387	445	166	175	152	Day 1
	620	514	577	448	300	368	172	214	209	„ 2
	391	342	395	294	266	276	97	76	119	„ 3
	273	288	405	212	227	303	61	61	102	„ 4
	..	..	..	..	..	..	114	44	84	„ 5

Weights at beginning of experimental period: A.M.J., 11st 1 lb.; K.D., 8st. 7 lb. J.F.M., 14st. 4 lb.

regarding the range of total solute output in the 24 hours in subjects under normal conditions. Bull (1955) gives the normal rate of solute excretion as 0·8 to 1·5 milliosmoles (m.osm.) per minute. This would be equivalent to 1150 to 2160 m.osm. in the 24 hours. These rates of solute excretion may be found for short periods, but only the lower figures are likely to be met with in subjects taking an average diet. Our own figures for the excretion-rate during the day, as opposed to the night, are in agreement with those given by Jones and de Wardener (1956). As is apparent from our results, the rate of solute excretion is much greater during the day than during the night, and any observations assessing long-term solute excretion must take the 24-hour total into account rather than that over shorter periods.

We here set out the result of an experiment designed to produce oliguria with urine of "fixed" specific gravity in normal adults by a diet almost devoid of nitrogen and electrolytes, thereby reducing the total solute-load excretable in the urine. This simulates the clinical situation of a patient either eating only very small amounts or on gastric or intravenous feeding, predominantly with carbohydrates. Unfortunately, the subjects of the experiment were themselves attempting to assess the results and control the details, in particular the fluid intake, as the experiment proceeded. After the 4th day, none of the subjects was in a state to be critical, and although the results quite adequately prove the point, the proof could have been more striking if fluid intake had been more carefully controlled towards the end of the experiment.

Methods

Three normal adults, two men (J. F. M., A. M. J.) and one woman (K. D.), were put on a low-salt diet (less than 22 m.eq. per 24 hours) for 2 days, and then took only glucose or lactose drinks for a further 4 days until the end of the experiment. Nothing was taken by mouth from 6 P.M. to 8 A.M. All urine was collected, starting on the night of the first day on a low-salt diet. The subjects continued their normal activities, though by the second day of exclusively carbohydrate feeding, all three felt unwell, light-headed, and euphoric. During the last 2 days, a "mid-day meal" was allowed of two thin slices of salt-free bread and butter with sugar, because it was found increasingly difficult to take any quantity of glucose or lactose by mouth. Three control day and night collections, without food or water restriction, were also made from each subject at another time.

Urine was collected under toluol. Specific-gravity measurements were made at room temperature with a single clinical hygrometer.

Urine osmolarities were measured by the depression of freezing-point, with distilled water and standard solutions of sodium chloride as controls. Sodium and potassium were estimated by flame photometer. Urinary urea was estimated by the hypobromite method.

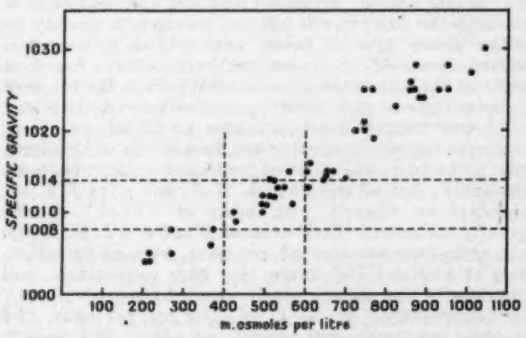
TABLE II—HOURLY SOLUTE EXCRETION-RATE

Period	Day			Night			
Subject	A.M.J.	K.D.	J.F.M.	A.M.J.	K.D.	J.F.M.	
Excretion (m.osm.) per hour)	46·7	36·0	40·5	22·4	36·2	35·8	Control
	61·0	48·2	52·5	30·0	24·2	22·0	Control
	50·0	45·5	57·5	27·0	33·7	22·8	Control
	42·3	27·0	31·2	18·5	20·0	15·6	Day 1
	29·9	21·0	25·8	19·2	22·0	21·5	„ 2
	19·6	17·7	19·3	10·8	8·4	12·2	„ 3
	14·4	15·1	21·6	5·8	6·8	10·2	„ 4
	16·3*	12·0†	18·3‡	12·3	4·9	8·4	„ 5

* 8 A.M.–11.30 A.M. (3·5 hours)
† 8 A.M.–1.30 P.M. (5·5 hours)
‡ 8 A.M.–11.00 A.M. (3 hours).

Results

During the control periods, the total solute-excretion in 24 hours ranged from 857 to 1168 m.osm. in the three



Relation between specific gravity and osmolar concentration.

subjects (table I). The solute excretion-rate during the day (8 A.M. to 11 P.M.) collection ranged from 36·0 to 61·0 m.osm. per hour, and during the night (11 P.M. to 8 A.M.) collection from 22·0 to 36·2 m.osm. per hour (table II).

During the observations on the low-protein and low-electrolyte diet, the total 24-hour and day and night osmolar excretion fell progressively (table I), as did the hourly excretion-rate (table II). The mean total 24-hour excretion during the control collections was 966 m.osm.; on day 4 it was only 322 m.osm.—a third of the control figure.

The specific gravity of the urine correlated well with the osmolar concentration (see figure). The range of generally accepted "fixed" specific gravity, 1008–1014, represents an osmolar range of about 400–600 m.osm. per litre, considerably higher than the generally supposed isosmolarity with plasma. This specific-gravity range, however, is that associated clinically with advanced renal failure, irrespective of the urine-flow.

In the only three control collections with low urine-flow (table III), all at night, with 25·8, 29·0, and 31·7 ml. per hour, the specific gravity was 1027, 1019, and 1020

TABLE III—SPECIMENS WITH LOW URINE-FLOWS

Subject	Collection period	ml. per hour	m.osm. per hour	m.osm. per litre	Specific gravity	Urea (g. per 100 ml.)	Sodium m.eq. per l.
A.M.J.	CN	29·0	22·4	770	1019	..	..
	N 1	19·3	18·5	955	1025	3·3	53
	N 2	24·2	19·2	880	1024	3·5	26
	N 3	14·9	10·8	726	1020	2·5	13
	N 4	7·9	5·8	745	1025	2·5	4
	D 4	20·8	14·4	690	1016	2·6	10
	N 5	24·9	12·3	496	1011	1·7	3
	D 5	30·0	16·3	572	1011	2·4	7
K.D.	CN	31·7	24·2	745	1020	..	..
	N 1	22·6	20·0	885	1024	3·7	55
	N 2	23·6	22·0	932	1025	4·0	36
	N 3	10·2	8·4	823	1023	3·1	11
	N 4	9·1	6·8	745	1021	2·6	14
	N 5	6·3	4·9	766	1026	3·1	10
	D 5	32·8	12·0	367	1006	1·2	5
J.F.M.	CN	25·8	22·8	920	1027	..	..
	N 1	16·8	15·6	955	1028	3·6	47
	N 2	20·6	21·5	1045	1030	4·4	41
	N 3	14·2	12·2	864	1025	3·0	11
	N 4	11·6	10·2	875	1028	3·1	9
	N 5	9·8	8·4	862	1026	3·1	4
	D 5	30·0	18·3	610	1013	2·5	6

N = night ; D = day ; CN = control night.

respectively, and the corresponding excretion rate 22·8, 22·4, and 24·2 m.osm. per hour. During the experimental diet the osmolar excretion-rate fell during the night to below 10 m.osm. per hour for at least one period in each individual.

To simulate an oliguria with urine of "fixed" specific gravity, and with normal renal function and low osmolar load, the urine volume has to fall into a certain range: if it is too low the solute content will rise, and if it is too high the content will fall, and the specific gravity lie either above 1014 or below 1008. With an osmolar-excretion-rate of 10 m.osm. per hour, as was found at night at the end of the experimental period, the range of urine-volume to give specific gravities between 1008 and 1014 was from 16·7 ml. per hour to 25 ml. per hour. Owing to the poor control of the fluid-intake at this time, the urine-flow was allowed to fall too low in most instances; but N5 and D5 in A. M. J., and D5 in J. F. M., simulate an oliguria with urine of "fixed" specific gravity (table III). Both in A. M. J. D5 and J. F. M. D5, the urine-flow was 30·0 ml. per hour, with an excretion-rate of 16·3 and 18·3 m.osm. per hour respectively, and the density near the top of the accepted range of "fixed" specific gravity. A. M. J. N5 (24·9 ml. per hour, 12·3 m.osm. per hour, 496 m.osm. per litre, and specific gravity 1011) very clearly shows the characteristics usually indicating severe renal failure.

In D5 of K. D., the osmolar excretion-rate is lower than in the corresponding period for the other two subjects, but the urine-flow is just above the arbitrary level of 30 ml. per hour accepted as the upper limit of oliguria. From plotting all values for osmolar excretion-rate against the urine-flow, it is apparent that there is a roughly direct relationship between urine-flow and osmolar excretion-rate. In K. D. D5, it is probably permissible to assume that the osmolar excretion rate would not increase with a diminished urine flow; if the urine-flow had been 24 ml. per hour, the maximum concentration would have been 500 m.osm. per litre, with a specific gravity of about 1012.

In the four instances where the urine-flow was below 10 ml. per hour (240 ml. per 24 hours), the solute excretion rate was also very low—5·8, 6·8, 4·9, and 8·4 m.osm. per hour. Without comparably low urine-flows under control conditions, it is impossible to draw conclusions as to the effect of increased urine-flow.

Urea and potassium excretion fell less strikingly than that of sodium (table IV). A maximum nitrogen-sparing effect has certainly not been achieved, but this would not be expected with normal activities being carried on during the observation, and the poor intake of lactose or glucose by the subjects.

Discussion

Based on theoretical argument, a successful attempt has been made to simulate oliguria with urine of "fixed" specific gravity in normal subjects by reducing the osmolar excretable load by dietetic means. With a normal osmolar 24-hour excretion of about 1000 m.osm., the 24-hour urine-volume must lie between 1670 and 2500 ml. for the osmolar concentration to be between 600 and 400 m.osm. per litre, falling into the specific-gravity range 1008–1014. The excretable osmolar load is largely composed of urea and sodium and potassium salts. With the diminished calorie requirements of a patient lying in bed, the reduction in food-intake may be expected to reduce the 24-hour excretable load to 750 m.osm. With this 24-hour solute-excretion, the volume must lie between 1750 and 1170 ml. per 24 hours for the content to be in the same range These values may, of course, be set too high for very light individuals eating only small amounts of food With a 24-hour solute load of 500 m.osm., the urine-volume would have to lie between 1200 and 800 ml. per 24 hours for the specific gravity to be between 1008–1014.

During the period of observations with the experimental diet, the 24-hour osmolar excretion fell below 400 m.osm. on the 3rd day in all three subjects—391, 342, and 395 m.osm.; total urine-volumes of 650, 570, and 660 ml respectively would have given a concentration of 600 m.osm. per litre (specific gravity about 1014) On the fourth day in A. M. J., a 24-hour volume as low as 455 ml. would have given a concentration of 600 m.osm. per litre.

In two subjects the low-calorie carbohydrate diet resulted in simulating oliguria with urine of "fixed" specific gravity, if by chance the urine-volume was of the right order. In the other subject the urine-flow was just in excess of 30 ml. per hour, arbitrarily defined as oliguria; it is argued that with a slightly smaller fluid-intake urinary finding would have been the same as in the other two subjects. In several conditions (e.g., coma, severe hepatic parenchymal damage, or after operations) parenteral feeding is likely to be used. This will be predominantly, if not exclusively, carbohydrate, and the volume of urine will depend largely on the fluid administered; with some cause for an increase in extra-renal water-loss, such as fever or overbreathing, the available water for excretion may be much lower than is supposed. With the diminished osmolar load, the urinary specific gravity may not rise as the urine-volume

TABLE IV—EXCRETION OF SODIUM, POTASSIUM, AND UREA DURING EXPERIMENTAL-DIET PERIOD

Day	24 hours			Day			Night		
	A.M.J.	K.D.	J.F.M.	A.M.J.	K.D.	J.F.M.	A.M.J.	K.D.	J.F.M.
	SODIUM (M.EQ. PER PERIOD)								
1	70·4	30·5	66·5	61·2	19·6	59·0	9·2	10·9	7·5
2	21·7	19·7	22·7	16·6	11·4	14·5	5·1	8·3	8·2
3	15·3	7·2	9·9	13·6	6·2	8·4	1·7	1·0	1·5
4	4·2	..	..	3·9*	..	..	0·3	1·1	1·0
5	3·9	3·1	3·6	3·2*	2·5*	3·2*	0·7	0·6	0·4
	POTASSIUM (M.EQ. PER PERIOD)								
1	69·9	47·6	47·4	59·5	37·8	31·4	10·4	9·8	16·0
2	36·1	35·9	40·8	24·9	21·4	27·2	11·2	14·5	13·6
3	34·3	28·5	33·8	23·2	20·9	20·0	11·1	7·6	13·8
4	29·3	..	..	23·4*	..	..	5·9	7·3	10·2
5	22·1	20·8	41·2	16·6*	14·7*	32·3*	5·5	6·1	8·9
	UREA (G. PER PERIOD)								
1	26·1	22·5	20·9	20·4	15·1	15·2	5·7	7·4	5·7
2	20·2	19·2	19·0	13·3	10·0	10·2	6·9	9·2	8·8
3	12·6	9·0	13·2	9·6	6·2	9·1	3·4	2·8	4·2
4	9·9	8·0	12·2	7·9	5·9	8·6	2·1	2·1	3·6
5	..	..	..	..	..	..	3·9	1·8	3·2

*Corrected to 15 hours.

decreases, and oliguria with urine of "fixed" specific gravity may be simulated, as in the experiments reported.

Are these results to imply that it is impossible to differentiate urine of a patient with acute renal failure with tubular damage from urine of a patient in whom the excretable solute load is reduced by dietetic means? The main difference between the urine of a patient with acute renal failure and that of a subject with normal kidneys will lie in the sodium and urea content. On the third day of diet, the total sodium excretion in the three subjects amounted to only 15·3, 7·2, and 9·9 m.osm., as compared with 70·4, 30·5, and 66·5 m.osm. on the first day when sodium-restriction had already started. The sodium contents in the low-volume specimens (table III) are all well below 20 m.eq. by the third day. In the functional disturbance associated with acute tubular necrosis, one of the striking features during the early phase is the inability of the kidney to reabsorb sodium and potassium, irrespective of the body need to conserve these ions (Bull, Joekes, and Lowe 1950), and the urinary sodium content is about 60 m.eq. per litre. In most situations where the problem arises of differentiating oliguria due to renal failure from physiological oliguria, sodium retention by the kidney will be an inevitable response to the metabolic disturbance, or parenteral feeding. The urinary urea with acute renal failure is usually less than 1·4 g. per 100 ml., but will tend to be higher with physiological oliguria, and may be more than 2 g. per 100 ml.

It cannot be too strongly emphasised that, in our opinion, examination of the urine, preferably with the volume and specific gravity of each individual specimen, is the essential step in enabling one to diagnose renal failure early. That occasionally oliguria with urine of "fixed" specific gravity may be encountered with normal renal function is predictable on theoretical grounds, and has been confirmed in the present work. To establish whether urine of "fixed" specific gravity is the result of renal failure or of a physiological response, the urinary urea and sodium content should be estimated in each specimen passed until a diagnosis is made. In physiological oliguria, the urea-content may be high (2·0 g. per 100 ml.) and the sodium low (less than 20 m.eq. per litre).

Summary

Observations of urine-volume, specific gravity, and osmolar concentration have been made in three subjects on a low-calorie carbohydrate diet. In two subjects oliguria with urine of "fixed" specific gravity, was simulated, with the urine-volumes not exceeding 30 ml. per hour and the specific gravity in the range 1008–1014. In the third subject the urine-volumes were not sufficiently well controlled to fall strictly within this definition.

The failure to concentrate the urine at low urine-flows is explained by the reduction in total osmolar load excreted by the kidneys during the period of the experimental diet.

Clinical situations are considered in which acute renal failure might be diagnosed from the presence of oliguria with urine of "fixed" specific gravity, where the oliguria is a physiological response.

The main point of differentiation of oliguria with urine of "fixed" specific gravity, due to renal failure, from a physiological oliguria, is in the sodium content, which is low in physiological oliguria, and will be expected to be less than 20 m.eq. per litre. The urinary urea concentration in the physiological oliguria will tend to be higher; in acute tubular necrosis this is usually not more than 1·4 g. per 100 ml., and may exceed 2 g. in the physiological oliguria.

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THE ELECTROENCEPHALOGRAPH IN LIVER DISEASE

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THE syndrome of "impending hepatic coma" includes alterations in personality and behaviour which may precede loss of consciousness by hours, months, or even years (Adams and Foley 1953, Sherlock et al. 1954, Summerskill et al. 1956). Objective neurological findings are often intermittent or absent, and clinical diagnosis may mainly depend on psychiatric assessment, an approach which cannot always differentiate the syndrome of hepatic coma from other organic dementias (Davidson and Summerskill 1956). The electroencephalogram is abnormal in "hepatic" coma (Foley et al. 1950, Bickford and Butt 1955), and this might be a welcome diagnostic method in the precomatose state. Neuropsychiatric deterioration in patients with liver disease may follow the administration of certain nitrogenous substances—e.g., a high-protein diet, urea (Phillips et al. 1952), ammonium salts (Van Caulaert et al. 1932), and methionine (Phear et al. 1956)—and improvement follows their withdrawal (Sherlock et al. 1954). It seemed possible that changes in the electroencephalogram effected by altering the amount of nitrogen in the intestine might also be of diagnostic value.

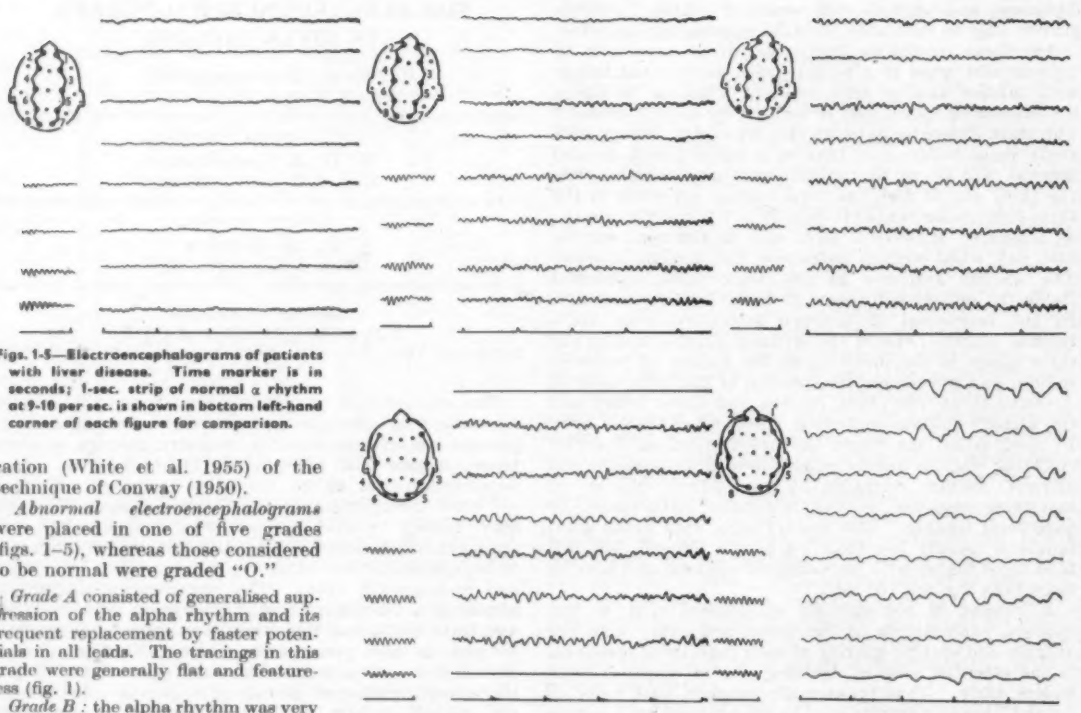
Material and Methods

One hundred and fifty-seven electroencephalograms were made in 31 male and 31 female patients with liver disease, 2 patients with extrahepatic portal-vein obstruction, and 2 patients in renal failure. 53 patients, including 4 with chronic alcoholism, had portal cirrhosis; 4 had virus hepatitis; 3 had biliary cirrhosis; and 2 had cirrhosis associated with hæmochromatosis. The diagnosis was usually evident on clinical and biochemical grounds but, where necessary, was confirmed by aspiration liver biopsy.

Neuropsychiatric changes preceding hepatic coma were graded as follows:

Grade O: no abnormality detected.
Grade I: trivial lack of awareness, euphoria or apathy in the absence of unequivocal neurological abnormality, and impaired performance of simple psychological tests, including the construction of a five-pointed star (Davidson and Summerskill 1956) and the ability to add or subtract serial sevens.
Grade II: obvious personality change with definite neurological abnormality, of which a flapping tremor (Adams and Foley 1953) was the most characteristic. The gross façade of personality was preserved at this stage.
Grade III: advanced confusion and disorientation.
Grade IV: stuporose but responding to stimuli.

A high-protein diet, ammonium chloride, and methionine was given by mouth with careful supervision and daily assessment of the neuropsychiatric state. Percutaneous transplenic venography was done by the method of Atkinson et al. (1955), and the ammonium levels in arterial blood, peripheral-vein blood, and cerebrospinal fluid were determined by a minor modifi-



Figs. 1-5—Electroencephalograms of patients with liver disease. Time marker is in seconds; 1-sec. strip of normal α rhythm at 9-10 per sec. is shown in bottom left-hand corner of each figure for comparison.

cation (White et al. 1955) of the technique of Conway (1950).

Abnormal electroencephalograms were placed in one of five grades (figs. 1–5), whereas those considered to be normal were graded "O."

Grade A consisted of generalised suppression of the alpha rhythm and its frequent replacement by faster potentials in all leads. The tracings in this grade were generally flat and featureless (fig. 1).

Grade B : the alpha rhythm was very unstable and disturbed by random waves at 5–7 per sec. over both hemispheres. The rhythms were most often seen over the temporal lobes. In many of the cases there was an underlying fast activity (fig. 2).

Grade C presented a distinctive picture. An alpha rhythm was still to be seen but was disturbed over both hemispheres by medium-voltage 5–6 per sec. waves. These occurred in runs, were not paroxysmal, and did not usually block to eye opening, though in some of the records blocking did occur. The rhythms were particularly well seen over the temporal and the frontal lobes (fig. 3).

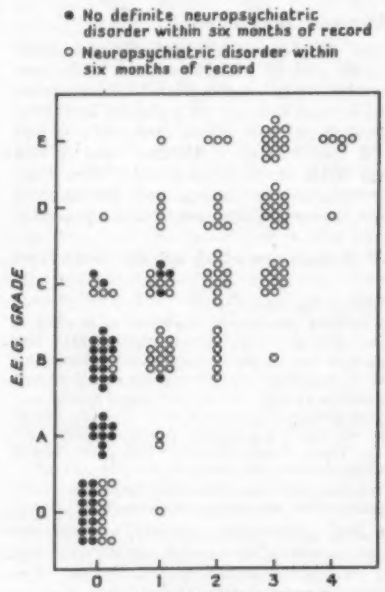


Fig. 6—Neuropsychiatric disability compared with electroencephalographic changes in patients with liver disease.

Grade D : the 5–6 per sec. rhythms seen in grade C were now constant in all areas and replaced all other cortical activity recorded on the electroencephalogram. The appearance of this abnormality in a patient presenting with only slight neuropsychiatric symptoms is very striking (fig. 4).

Grade E : the 5–6 per sec. rhythms were replaced by frontally preponderant bilateral synchronous 2 per sec. rhythms which spread backwards over the hemispheres. At times the 6 per sec. rhythms might reappear, but the special feature of the records was the occurrence of these diencephalic discharges (fig. 5).

This grading was arbitrary, and deterioration or improvement of electrical activity, shown by the number and slowness of the abnormal rhythms, may occur without passing necessarily from one grade to another.

Results

Relationship of Grading of Electroencephalogram to Neuropsychiatric State

A fair correlation exists between the neuropsychiatric condition and the severity of the electroencephalographic changes in patients with liver disease (fig. 6). Patients with no detectable neuropsychiatric abnormality usually showed normal or grade-A electroencephalographic changes. 17 records, however, showed grade-B changes, and grade-C and grade-D abnormalities were present in

TABLE I—RELATIONSHIP OF DIETARY NITROGEN TO NEUROPSYCHIATRIC AND ELECTROENCEPHALOGRAPHIC CHANGES IN PATIENTS WITH LIVER DISEASE

Case no.	Gastrointestinal nitrogen per 24 hr.	Clinical grade	E.E.G. grade
1	Protein 0 g.	I	A
	,, 50 g.	II	C
	,, 50 g. + NH_4Cl 10 g.	IV	E
	,, 50 g. + dl-methionine 10 g.	IV	E
2	,, 10 g.	III	D
	,, 20 g.	IV	E
3	,, 20 g.	II	C
	,, 40 g.	III	C
	,, 70 g.	IV	E
4	,, 50 g.	III	D
	,, 50 g. + neomycin 6 g.	I	B
5	,, 60 g.	O	O
	,, 60 g. + dl-methionine 10 g.	II	C
6	,, 20 g.	I	B
	,, 55 g.	III	E
	,, 55 g. + neomycin 6 g.	O	O
	,, 70 g.	III	E
7	,, 50 g.	II	D
	,, 50 g. + neomycin 8 g.	I	C

records from 7 patients, all of whom had exhibited definite neurological disorder within six months or who were receiving high-protein (120–150 g.) diets.

15 of 31 records taken from patients with a minimal or dubious disturbance of cerebral function (grade I) showed severe (grade C-E) abnormalities. Only 3 records had normal or grade-A changes and 13 records revealed grade-B disturbance. The degree of electroencephalographic change during unequivocal neuropsychiatric disorder (grades II–IV) was more closely related to the clinical assessment, all the patients with grade-IV hepatic precoma having grade-D or grade-E electroencephalograms. In the less advanced stage of hepatic coma (grade II) 25% of records showed grade-B changes but normal and grade-A records were not obtained.

Effect of Nitrogenous Substances on Electroencephalogram

7 cirrhotic patients had a chronic neuropsychiatric disorder with intolerance of nitrogenous substances in association with an extensive portal-systemic collateral circulation (Summerskill et al. 1956) (table I).

TABLE II—NEUROPSYCHIATRIC AND ELECTROENCEPHALOGRAPHIC GRADE IN CIRRHOTIC PATIENTS BEFORE AND AFTER TAKING PROTEIN 120 G. DAILY FOR 7 DAYS

Case no.	Before		After	
	Clinical grade	E.E.G. grade	Clinical grade	E.E.G. grade
8	0	A	0	A
9	0	B	0	B
10	0	0	0	0
11	0	B	0	B
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	B	0	B
17	0	B	0	C
18	0	0	0	C
19	0	B	0	C
20	0	0	0	B
21	I	D	III	D
22	0	A	0	A
23	0	B	0	B
24	I	C	I	C

In these patients, although the threshold of tolerance varied, an increased intake of protein always produced deterioration in both the electroencephalogram and in the neuropsychiatric state. In 2 patients (cases 1 and 5) oral dl-methionine had a similar effect, and in case 1 oral ammonium chloride also caused deterioration.

Conversely, oral neomycin exerted a protective action both on the electroencephalogram and on the clinical state. 3 patients (cases 4, 6, and 7) with severe neurological and electroencephalographic changes on diets containing 50 or 55 g. of protein tolerated the same amount of protein with relatively little clinical or electroencephalographic abnormality when receiving 8–10 g. of neomycin daily. One of these patients (case 6) showed a reversion to normal from grade-III neurology and grade-E electroencephalographic changes.

17 patients without any previous history of impending hepatic pre-coma or coma received a high-protein diet (120 g. of protein daily for seven days) either to assess their suitability for portacaval anastomosis or in an attempt to elucidate the significance of minor personality changes (table II). Electroencephalograms were recorded before and after the course of high-protein feeding. Only 1 patient (case 21) deteriorated clinically, and the initially gross electroencephalographic abnormality (grade D) was unchanged. 3 patients (cases 17, 18, and 19) showed grade-C electro-encephalographic changes after high-protein feeding, and the electroencephalogram of the fourth patient (case 20) deteriorated from normal to grade A. 2 patients with grade-A abnormality, 4 with grade-B, and 1 patient each with grade-C and grade-D changes had initially abnormal electroencephalograms unaffected by high-protein feeding.

TABLE III—ALTERATION OF NEUROPSYCHIATRIC STATE AND ELECTROENCEPHALOGRAM IN RELATION TO ALTERED LIVER FUNCTION IN TWO PATIENTS WITH HEPATIC CIRRHOSIS

Case no.	Dietary protein (g. per 24 hr.)	Serum-bilirubin (mg. per 100 ml.)	Serum-albumin (g. per 100 ml.)	E.E.G. grade	Clinical grade
25	50	0·4	4·6	B	II
	50	3·1	2·9	E	IV
26	150	2·1	2·4	C and D	O
	15	2·1	2·3	B and C	O
	150	1·0	3·4	B	O

Relation of Electroencephalogram to Liver Function

3 patients with acute hepatitis had grade-B or grade-C electroencephalograms. Only 1 of these had clinical neuropsychiatric disorder, and this was associated with grade-B electroencephalograms.

On two occasions it was possible to compare electroencephalograms before and during deterioration in liver function (table III).

As case 25, with biliary cirrhosis, became increasingly jaundiced, and his serum-albumin level fell, indicating failing liver function, he went into hepatic coma, and his electroencephalogram deteriorated from grade B to grade E; dietary protein was constant.

Case 26, with portal cirrhosis, mild jaundice, and gross ascites, showed grade-C and grade-D electroencephalographic changes during high-protein (100 g.) feeding. His jaundice and ascites diminished with improving liver function, and he now showed only grade-B electroencephalographic changes on a similar high-protein diet. At no time were there objective neuropsychiatric signs.

Relation of Electroencephalographic Grading to Ammonium Levels

The proportion of normal ammonium levels—blood <1 µg. per ml.; cerebrospinal fluid (C.S.F.) <0·5 µg. per ml.—was highest in association with normal or grade-A electroencephalograms (fig. 7). Conversely, the proportion of abnormal levels increased with the severity of the electroencephalographic changes from grade B to grade D. These trends in ammonium level held true for arterial and venous blood and C.S.F. but are not sufficiently well defined to suggest a precise relationship between ammonium level and the degree of electroencephalographic abnormality.

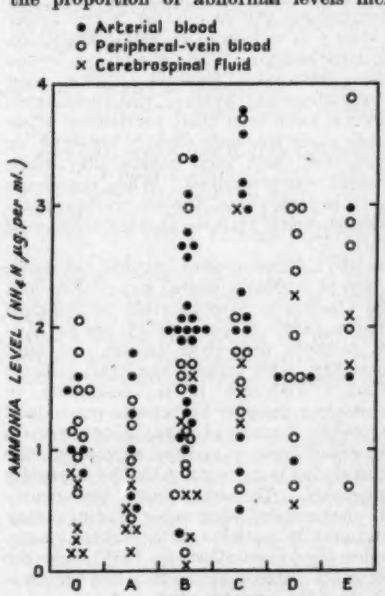


Fig. 7—Ammonium levels in blood and C.S.F. compared with electroencephalographic changes in patients with liver disease.

Extrahepatic Portal Obstruction and Uræmia

Electroencephalograms were

recorded from 2 patients with histologically normal livers and extrahepatic portal-vein obstruction shown by transplenic venography. The result was normal in 1 patient, but the other one, a lady aged 78 who exhibited the characteristic syndrome of impending hepatic coma during an episode of diarrhœa, had grade-B, grade-C, and grade-D abnormalities on successive electroencephalograms. 2 patients with chronic renal failure and raised blood-urea levels (315 mg. and 450 mg. per 100 ml.) showed neuropsychiatric changes, including clouding of consciousness, a "flapping" tremor and increased muscle tone and deep tendon-reflexes. The electroencephalogram was abnormal in both patients, grade-B and grade-C changes being present.

Discussion

The correlation between the electroencephalogram and the clinical condition of the patient supports the interpretation which we have placed on the sequence of the electroencephalographic abnormalities. The slow high-voltage delta discharges originally described by Foley et al. (1950) represent our advanced grade E and was only seen in patients whose consciousness was profoundly disturbed. The earlier 5–6 per sec. abnormality (grades C and D) corresponds to the theta phase reported by Bickford and Butt (1955), but the triphasic waves emphasised by these workers were rarely a feature of our records. The significance of fast flat activity with or without temporal-lobe abnormalities (grades A and B) is difficult to assess.

Grade-A abnormality is common in tense patients attending for electroencephalography, and there is no evidence that this is the initial change in hepatic precoma. Grade-B changes were common in patients with liver disease who had no neuropsychiatric disturbance, and were present in other patients with undoubted pre-coma. Probably this is the earliest significant change.

The important group of tracings from the clinical point of view is grades C and D. Constant activity of this sort occurring all over both hemispheres is infrequently encountered in adults in contradistinction to young children, in whom a dominant frequency of 5–6 per sec. is normal. It is seen in adults with deeply placed organic lesions (e.g., inflammation and neoplasm) in the upper part of the brain stem; in certain biochemical conditions (e.g., uræmia and hypokalæmia); and sometimes in the early phases of rising intracranial pressure. Two striking features of these very abnormal rhythms, when associated with hepatic precoma, have been their persistence when the neuropsychiatric state was only slightly involved, or was not even disturbed, and their reversibility when appropriate treatment was prescribed. When consciousness is lost owing to hepatic coma, the electroencephalogram loses any characteristic features and is therefore of no diagnostic value.

The more trivial electroencephalographic changes, grades A and B, are to a greater degree non-specific and often exist in the absence of demonstrable neurological or psychiatric abnormality. Moreover they are particularly common in patients with liver disease and mild psychiatric abnormality, who present the most difficult diagnostic problem. Although it is reasonable to attribute the psychiatric disorder to hepatic precoma if electroencephalographic changes of grade B or more are present and other possibilities have been eliminated, the finding of a normal record is more valuable, for it usually excludes the diagnosis. However, both the neuropsychiatric and electroencephalographic findings may be extremely fluctuant in patients with chronic neuropsychiatric disorder (Summerskill et al. 1956), and the clinical condition of the patient at the time the record is taken is particularly relevant.

Although Bickford and Butt (1955) found a normal alpha rhythm in 8 patients with uncomplicated liver disease, we have found abnormal records, sometimes severe, in patients without clinical neuropsychiatric abnormality. It is not surprising that in some patients the electroencephalogram is a more sensitive index of cerebral disturbance than is clinical assessment, because the cerebral utilisation of oxygen in hepatic insufficiency may also be decreased without obvious neurological disturbance (Fazekas et al. 1956). The mechanism of the electroencephalographic changes is unknown, but they are presumably related to the same factors as the clinical disturbance with which they are correlated.

The genesis of the syndrome of hepatic coma (portal-systemic encephalopathy) depends on the adequacy of liver function, the extent of the portal collateral circulation, and the amount of nitrogenous material exposed to bacterial action in the intestines (Sherlock et al. 1954), and these factors were also shown to govern the electroencephalographic changes. Deterioration of liver function was accompanied by electroencephalographic abnormalities, sometimes in the absence of neuropsychiatric disorder, and patients with extensive portal collateral circulations showed extreme clinical and electroencephalographic fluctuations in response to alterations of dietary protein, once in the absence of liver disease. Neomycin prevented deterioration of the electroencephalogram during protein-feeding in sensitive patients, presumably by inhibiting the intestinal flora in a manner similar to the protective action exerted by chlortetracycline during treatment with dl-methionine (Phear et al. 1956, Martini et al. 1957).

The exact nature of the metabolic disorder responsible for the neuropsychiatric and electroencephalographic changes is uncertain, but ammonium toxicity has been suggested, and intravenous ammonium chloride has produced the electroencephalographic changes of hepatic coma (Friedlander 1956). We could not relate closely the levels of ammonium in arterial and venous blood or in C.S.F. to the electroencephalographic changes in our patients; but the higher ammonium levels tended to be associated with more severe electroencephalographic changes in a relationship similar to that reported between venous or arterial ammonium levels and the neurological state in hepatic coma (Traeger et al. 1954, Phear et al. 1955).

Borderline electroencephalograms may be interpreted more clearly if they deteriorate after giving the patient protein, methionine, or ammonium chloride, or improve after dietary protein is withheld or neomycin administered. Only very sensitive patients may show electroencephalographic changes with these regimes, and a lack of response does not abolish the significance of spontaneous electroencephalographic changes. This routine, however, is of value in assessing obscure mental and neurological disturbances in patients with liver disease. It is particularly relevant in the assessment of patients for portacaval anastomosis, an operation known to cause impending hepatic coma (episodic stupor) (McDermott and Adams 1954) in up to 30% of patients (G. Wooler, personal communication). Prior assessment of protein tolerance is obviously desirable to exclude unsuitable candidates. If grade-II clinical or grade-D electroencephalographic changes develop after an intake of 150 g. of protein for a week, operation is usually contraindicated.

Summary

One hundred and fifty-seven electroencephalograms were made in 62 patients with liver disease and various degrees of neuropsychiatric disturbance, 2 patients with extrahepatic portal-vein obstruction, and 2 patients with renal failure.

The electroencephalograms were graded and showed a good correlation with the grade of the neuropsychiatric disturbance preceding hepatic coma.

Deterioration of the electroencephalogram could sometimes be induced by increasing dietary protein and

administering methionine or ammonium chloride. Reduction of dietary protein and the administration of neomycin usually improved an abnormal electroencephalogram.

The electroencephalographic abnormality was related to liver-cell function, the portal collateral circulation, and the amount of nitrogen in the intestine.

The electroencephalogram showed an ill-defined correlation with the blood or the C.S.F. ammonium level.

The mechanism and specificity of the electroencephalographic changes and their value in the diagnosis of neuropsychiatric changes in patients with liver disease and in the assessment of patients for portacaval anastomosis are discussed.

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OUTPATIENT P.A.S. THERAPY

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Matilda told such Dreadful Lies,
It made one Gasp and Stretch one's Eyes;
Her Aunt, who, from her Earliest Youth,
Had kept a Strict Regard for Truth,
Attempted to Believe Matilda:
The effort very nearly killed her.

Hilaire Belloc: *Cautionary Tales.*

THE use of dual chemotherapy regimes to avoid bacterial resistance in patients with tuberculosis is now an accepted principle; and chest physicians often prescribe a combination of isoniazid and *p*-aminosalicylic acid (P.A.S.) as long-term ambulant chemotherapy for many patients.

To prevent the emergence of resistant strains of *Mycobacterium tuberculosis*, P.A.S. must unfortunately be taken in doses near to the limit of tolerance, and there is thus a real risk that patients may not take enough of the drug. Subjective assessment of the patients' reliability in this respect is open to grave error, so that an objective estimation of P.A.S. consumption is of considerable value. Since the drug is eliminated via the kidneys (Venkataraman et al. 1948, Way et al. 1948), indirect evidence of consumption can be obtained by chemical tests for P.A.S. in the urine. Occasional use of such a test in our routine work suggested that many apparently reliable patients were untrustworthy, and this supported a previous finding in 100 Scottish outpatients (Simpson 1956). Since no previous trial had been carried out to determine how reliable a complete population of outpatients is in taking P.A.S., we decided to make such an objective assessment of our patients.

Method

Three tests have been used to detect P.A.S. or its derivatives in urine, depending on colour produced with Ehrlich's reagent, with hypochlorite, or with ferric chloride (Penman and Wraith 1956, Simpson 1956, Ruiz 1957). An intense violet colour is produced when urine containing P.A.S. is treated with ferric-chloride solution, but this test is difficult to read when it is done in the usual way on undiluted urine. The violet tint is obscured by the brown colours of the urine and the reagent, and precipitation of ferric salts usually causes turbidity. The difficulty can be overcome if the reaction is carried out in high dilutions by mixing water (5 ml.), urine (6 drops or 0·1 ml.), and 3% ferric-chloride solution (1 drop). With these quantities, urine containing 100 mg. of P.A.S. per 100 ml. produces a distinct violet colour, which becomes deeper as P.A.S. content increases. In a negative test the solution is colourless and only slightly opalescent.

This modified ferric-chloride test has the further advantage that false-positive reactions are greatly reduced. False reactions most commonly follow the ingestion of salicylates other than P.A.S., usually aspirin. Tests were done on urine specimens from 8 patients with rheumatoid arthritis who were receiving up to 100 gr. of aspirin daily. With the test as described, negative results were obtained in all cases, although violet colours were readily produced if the amount of ferric-chloride solution was increased. It follows that aspirin preparations taken by the patients are unlikely to invalidate the test. A further small trial on 6 inpatients showed that the reaction remained positive for up to twelve hours after the ingestion of 5 g. of P.A.S. but became negative thereafter. Urine stored for up to twenty-four hours after voiding remained positive to the test.

The trial took place during two weeks in the spring of 1957. If a patient attended the clinic during that period the urine was tested at this visit. Otherwise all specimens were collected at the patients' homes by the health visitors, who called without prior notice. A great deal of this work was done in the evenings when patients who were working came home; the collections were made on different evenings, but always on days when patients should have been taking the drugs. The specimens collected were tested on return to the clinic. A patient whose test was negative at the time of a clinic visit did not have a further specimen collected at home.

Results

Of 151 patients (59 women and 92 men) only 76 (50%) gave a positive reaction for P.A.S. in their urine. Young women had the lowest proportion of positive reactions (see table). From the 99 patients who were working, 57 urines (57%) gave a positive result, whereas only 19 (36%) from the 52 not working were positive. The working men, with 66% of positive urine tests, yielded a higher figure than the working women (42%).

Duration of chemotherapy made little difference to the results. About half the urines gave negative results, regardless of the time the patients had been receiving P.A.S.

RESULTS OF URINE TESTS FOR P.A.S. IN 151 PATIENTS, ACCORDING TO SEX AND AGE

Age	Male			Female		
	Negative	Positive	% positive	Negative	Positive	% positive
0–29	6	10	63	19	10	34
30–49	14	27	66	15	11	42
50+	19	16	46	2	2	50
Total	39	53	58	36	23	39

Several preparations, including calcium benzoyl P.A.S., are in use at the clinic, and an attempt is made in every case to find a preparation which will cause least upset to an individual patient. We found, however, that the preparation used had little or no effect on the results.

Before the results of the urine tests were known, the health visitors were asked to judge whether their patients were taking the prescribed P.A.S. or not. They were not prepared to give an opinion in 48 cases. In the remainder, their opinions disagreed with the urine tests in 14 of the 44 women and in 15 of the 59 men. In all, their opinions proved unreliable in over a third of the cases.

Discussion

The success of P.A.S. therapy has always been threatened by its troublesome toxic effects. It has been estimated that over 30% of the patients taking the drug have nausea (Medical Research Council 1950), and anorexia is even more common. 33% of patients in the Medical Research Council trial had diarrhœa, but fortunately the more alarming hypersensitivity reactions are less common. Various attempts to reduce the gastro-intestinal irritation and to improve or disguise the unpleasant taste of P.A.S. have met with little success. It is not surprising, therefore, that we have found that half our patients, while professing to take P.A.S. in one of its various forms, were not in fact taking the drug.

This trial might be criticised because the results are based on a single urine test for each patient: it could be assumed that the test had been taken on the one occasion when each patient had defaulted. This criticism might have been sound had the number of negative tests been small, but our results are so clear-cut and the default-rate so high that we feel this argument is invalid. It is reasonable to assume that if a patient is unreliable once he is likely to be so again, and cannot be trusted to follow instructions meticulously. This is particularly so if the patients with negative tests profess to be regular consumers. Furthermore, it was felt that the patients would very soon guess the purpose of the test if we persisted in our investigations. We are satisfied that the default rate is very high, and further discussion is based on this premise. It seems probable that half the patients did not take P.A.S., even in the early days of their treatment, and have successfully deceived doctors and nurses for many months or years.

The significance of this fact should be accepted: it is easy to blind oneself to the obvious and assume that, while a patient progresses well, it is our prescriptions that are achieving this result. Many patients can heal their disease unaided, and often did so before the days of chemotherapy.

On the other hand, there are unexpected relapses, and if the value of long-term chemotherapy is accepted the drugs must be not only prescribed but taken: too often an unexpected bacterial resistance, revealed during a relapse, has indicated that P.A.S. was not taken during a previous course of dual chemotherapy. To replace individual drugs by single cachets or powders containing P.A.S. and isoniazid, as we have done for some years, is only a step forward. Although resistance will probably not develop if the drugs are taken, a new danger emerges of taking *no* chemotherapy, and is well illustrated in our patients, many of whom were supposed to be taking 'Pycamisan' or 'B-Pasinah.'

The time has come to reassess P.A.S. as an outpatient remedy, and we feel that its routine use should be abandoned in outpatients. The risks are too great, and a weekly urine test would rapidly become useless because the patient would learn its significance and take the necessary single dose to produce a positive result. We do not think that the use of any physical or chemical combination of P.A.S. and isoniazid containing less than 12 g. of P.A.S. is likely to prove a suitable alternative, and reasons for this have already been set out by two of us (Dixon and Stradling 1956). In our experience, daily streptomycin and isoniazid can be given for very much longer than is usually done, and it is now our aim to replace combinations containing P.A.S. by this regime wherever possible. The nurse giving the injection can then see that the isoniazid is consumed. For special cases kept on P.A.S. combinations as outpatients, the single urine-test here described is available for occasional use. It is simply performed, more specific than previously reported single tests, and easily read by nurses.

Many chemotherapy trials based on unsupervised oral medication have probably been built on very unsure foundations. However carefully they were controlled statistically and scientifically, the results may have been vitiated by inadequate consumption of prescribed drugs.

The gastro-intestinal side-effects of P.A.S. make this drug particularly difficult to take, but they may not be the only reason for our findings. Many patients feel well and see no need for medication, and others, when questioned, will admit to forgetfulness. The low cost to a patient in this country, suggesting that the drugs are of low intrinsic value, may also be another factor. But in fact one brand of commonly used cachet containing P.A.S. and isoniazid costs the Exchequer about 1*s.* per day per patient when the usual dose is given. The country is spending substantial sums on unconsumed P.A.S. (and probably on many other drugs). That there is a further large field for inquiry is suggested by the many tablets that can be found scattered in the flowerbeds surrounding some of our hospitals. If the patients cannot take their drugs, then at least the physicians should be aware of this and save them the trouble of throwing them away.

Summary and Conclusions

With a new and simple modification of the ferric-chloride test for the detection of urinary *p*-aminosalicylic acid, false positives are few and a second test is unnecessary.

All outpatients of one chest clinic who were receiving P.A.S. had specimens of urine tested without notice, and it was found that only half the patients had P.A.S. in their urine.

It is suggested that P.A.S. is not a suitable drug for long-term treatment of outpatients.

Our thanks are due to Mrs. M. Greenwood, Mrs. C. Milborne, Miss K. Reade, and Mrs. K. Royle, health visitors to the clinic, who undertook the major part of the practical field work in this trial. We also wish to thank Dr. J. D. Pryce who carried out some of the initial tests on the modified ferric-chloride reaction.

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NEEDLE BIOPSY OF THE PARIETAL PLEURA

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PIECES of parietal pleura have been excised under direct vision for diagnostic purposes by Sutliff et al. (1954), Small and Landman (1955), and Breckler et al. (1956). De Francis et al. (1955), Heller et al. (1956), and Donohoe et al. (1957) have used a Vim-Silverman needle to obtain aspiration biopsies of the parietal pleura.

RESULTS OF NEEDLE BIOPSY IN 116 CASES

Clinical assessment	Totals	Biopsy diagnosis			
		Tuberculosis	Malignant	Non-specific*	Inadequate specimen
Tuberculosis ..	78	51	5	18	4
Malignant ..	28	8	7	10	3
Pneumonia ..	10	1	0	7	2
Totals ..	116	60	12	35*	9

* In 5 of these 35 specimens appearances suggested the presence of an acute coccal infection. These cases will be discussed in detail in our later paper.

We report here our results with a needle which allows a punch-biopsy of the parietal pleura and aspiration of a pleural effusion in one operation (Abrams 1957). The procedure is simple and no more distressing to the patient than a chest aspiration; the only complications in this series have been one small subcutaneous hæmatoma, and a small pneumothorax, neither of which required treatment.

We have made such biopsies in 161 patients, most of whom had fluid in the pleural space at the time of biopsy. We report here the histological findings in 116 patients whose presenting feature clinically was a pleural effusion, the cause of which had not been definitely diagnosed at the time of biopsy. The criteria used for making the initial clinical and final pathological diagnoses, and the correlation between these, the examination of the fluid, and the results of biopsy, will be discussed in a later report.

Tuberculous granulation tissue in a biopsy from the parietal pleura (x 12).

In 72 cases out of 116 a definite diagnosis could be made on the result of needle biopsy alone (see table); in 35 the histological appearances were not diagnostic, and in 9 an inadequate specimen was obtained. In agreement with the American workers quoted above, we are particularly struck by the usefulness of this method in the diagnosis of suspected tuberculous effusions (see figure). Furthermore, in a number of cases diagnosed on clinical grounds as malignant, biopsy has been most helpful either in corroborating this diagnosis or in disproving it by showing the presence of tuberculous granulation-tissue in the pleura. It seems justifiable to conclude that needle biopsy of the parietal pleura often gives a rapid and accurate diagnosis, sometimes where other methods have failed, and in combination with more orthodox laboratory tests may allow a firm diagnosis to be made in a larger number of effusions than would otherwise be possible.

We are grateful to Air Commodore C. A. Rumball for permision to carry out this work and to the Director General of Medical Services, Royal Air Force, for permission to publish. Many physicians and surgeons have allowed us access to their cases. We are particularly indebted to Dr. Drew Thomson and Dr. H. Dexter for their help with the histological examinations.

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UNILATERAL "EMPHYSEMA"

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THIS condition was first clearly described by Macleod (1954) under the title of "Abnormal Transradiancy of One Lung." It is characterised by decreased movements and breath sounds on one side of the chest, a general diminution of the corresponding pulmonary radiographic markings without much distortion of their pattern, and an absence of any obstruction to the larger bronchi. It is thus distinguished from obstructive or compensatory emphysema, and from massive bullous or cystic change.

We report here four further cases, two of which were studied from the functional aspect. We also report the progress of five of Macleod's original cases.

Case-reports

Case 1.—An Army cadet, aged 17, was admitted to St. Thomas's Hospital with six years' history of exertional dyspnœa and recurrent left-sided chest pain. He said that he had had "pneumonia" at the ages of 7 years and 11 years; on the latter occasion he had been treated with penicillin. In both illnesses he was treated at home, and his chest was not radiographed. Subsequently he had a cough and exertional dyspnœa and was admitted in 1953 to another hospital for investigation. Radiography had shown increased translucency of the left lung, especially at the base. On bronchoscopy some narrowing of the left main bronchus had been noted and thought to be due to pressure from a gland. The patient had been readmitted to hospital on two occasions in the next two years. Once he complained of pain in the abdomen and left

shoulder, but nothing new was found, and bronchoscopy in 1954 was normal. Bronchography showed poor filling of the terminal bronchi but no other abnormality. About six months before the present admission the patient had developed an unproductive cough and found that dyspnœa interfered with his training.

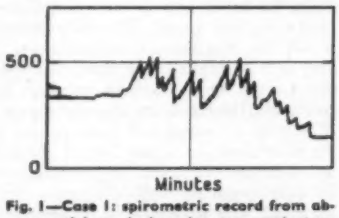

Fig. 1—Case 1: spirometric record from abnormal lung during vigorous respiratory efforts with main bronchus on normal side occluded. This and subsequent records read from right to left. Vertical lines indicate time in minutes.

On examination his trachea deviated to the left, and breath sounds were diminished over the left side of his chest. His sputum, hæmoglobin, white-cell count, and erythrocyte-sedimentation rate (E.S.R.) were normal. Radiography showed the whole of the left lung field to be more translucent than the right; the hilar shadows were smaller on the left than the right, and the mediastinum was slightly displaced to the left. On radioscopy the mediastinum moved to the left on inspiration but stopped before the maximal inspiratory position was reached; but the left diaphragm continued to descend for a short while after the mediastinal movement had ceased. On exercise there was no progressive inflation or deflation of the affected lung. Bronchography showed that the right bronchial tree was normal; the left main bronchi filled easily and were normal; there was some crowding of the segmental bronchi to the lower lobe; and, unlike the normal side, the finer branches of the bronchial tree were not filled. Bronchoscopy was normal.

Case 2.—A solderer, aged 35, complained of nine months' cough and exertional dyspnœa. He said that, at the age of 4 years, he had had pneumonia on three occasions within a year.

On examination the only abnormality was diminution of the breath sounds on the right side of his chest. Radiography showed increased translucency of his right lung field with a reduced hilar shadow; and, on screening, his right lung was seen to deflate less than his left with forced expiration. Bronchography was normal on the left, and on the right the only abnormality was some bunching of the middle-lobe branches. Bronchoscopy revealed nothing abnormal.

Case 3.—This patient first attended hospital in 1952 complaining of breathlessness and cough. He had been subject to attacks of winter bronchitis for years and brought up a moderate amount of yellow sputum.

On examination there were diminished breath sounds over the whole of the right side of his chest, and occasional rhonchi were heard over his left lung. There was no abnormality of his sputum, hæmoglobin, white-cell count, or E.S.R. Radiography showed that the whole of his right lung was more translucent than his left. Bronchography showed that the left side was normal; the right upper-lobe bronchus was abnormally small and served a reduced region; and the middle-lobe bronchus and the bronchus to the dorsal lobe were drawn upwards in compensation and the basal branches spread out, but without alteration in calibre.

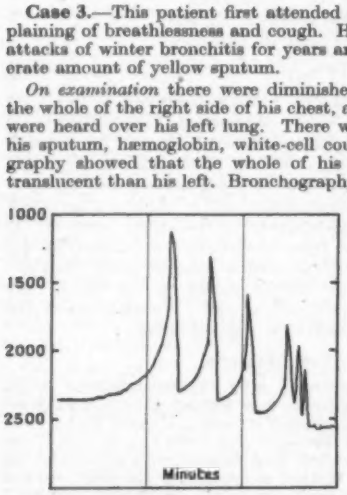

Fig. 2—Case 1: inflation of abnormal lung by pressure on spirometer bell. This displaces water in spirometer and produces spurious addition to spirometer trace of 30 ml. per cm. water. Removal of pressure produces a sudden drop proportional to pressure at the end of inflation, followed by curved trace of passive deflation.

Case 4.—This patient was discovered to have unilateral emphysema when examined in a mass-radiography unit. Three months earlier she had had a cough with yellowish sputum and left-sided chest pain. At the age of 8 years she had been in a children's home for a year. The reason for this was not clear, but it was possibly because of respiratory illness.

On examination, apart from diminished breath sounds over the left side of her chest there were no abnormal findings. Radiography showed reduced vascular markings of her left lung, with failure to deflate normally on expiration. Bronchography showed that the right bronchial tree was normal; the left main bronchi were normal; and there was good filling of the smaller bronchi; but there appeared to be some terminal dilatation in several of the lobules. Bronchoscopy showed frothy mucoid secretions on both sides but no evidence of endobronchial block or stenosis.

Special Investigations

Special investigations were made on cases 1 and 2.

The mechanical properties of the abnormal lung were observed with a bronchospirometry catheter during anæsthesia. The intra-œsophageal pressure was recorded, and each main bronchus in turn was connected to a spirometer. Similar results were obtained in both cases: when the bronchus on the normal side was occluded, vigorous respiratory efforts produced only very limited ventilation in the abnormal lung. In case 1 intrathoracic pressure swings of 30 cm. water produced a tidal air of about 125 ml. (fig. 1). After abolition of spontaneous respiratory by suxamethonium, the lung was further inflated by pressure on the spirometer bell. Although this method does not allow of precise measurement it shows a gross increase of airway resistance (fig. 2). A pressure of about 20 cm. water produced an inflation of 400 ml. in 5 sec. The slow passive deflation indicates a high ratio of resistance to elastance. Similar manœuvres on the other lung yielded normal results (fig. 3).

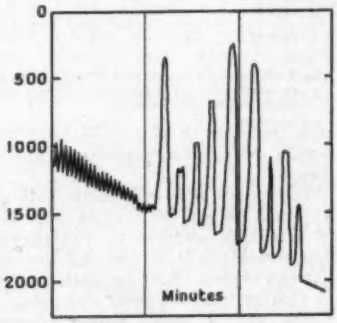

Fig. 3—Case 1: record from normal lung with abnormal side occluded. Left-hand side shows spontaneous respiration, and the right-hand side pressure inflations. Sloping base-line is due to oxygen consumption.

The *compliance of both lungs* together was measured by orthodox methods. The value for case 1 (0·09 litre per cm. water) is definitely low; that for case 2 (0·14 litre per cm. water) is in the lower part of the normal range. In interpreting these results it should be remembered that the contribution of the abnormal lung is probably negligible; hence the compliance of the other side was probably unimpaired.

The *arterial oxygen and carbon-dioxide tensions* were measured at rest and after moderate exercise on a bicycle ergometer. All values were normal.

Further studies were made on case 1 by Dr. P. Hugh-Jones at the Postgraduate Medical School. Conventional bronchospirometry under light thiopentone anæsthesia showed that the abnormal lung was responsible for 10% of the ventilation and for 5% of the oxygen uptake. The gas-exchange ratio was 0·8 on the normal and 0·75 on the abnormal side. Maximal breathing capacity was reduced to 79 litres per min. (normal 111–164). The ventilatory response to exercise was normal. During exercise an ear-oximeter indicated a brief fall of arterial saturation from 93 to 89%.

Follow-up of Earlier Cases

Five of the nine patients reported by Macleod (1954)

were traced. None had undergone any material change in symptoms. In the three cases where a new radiograph was obtained it had not changed.

Discussion

We have no reason to modify the clinical and radiological description given by Macleod (1954). It is noteworthy that in no case has the onset of the condition been observed. The radiograph leading to the diagnosis has often been occasioned by some chest infection; but the relation of the emphysema to the infection is questionable, and some cases have been discovered by mass radiography. Symptomatically there is no indication of a sudden onset, and the follow-up information suggests that the condition is often virtually static.

There is a strong resemblance between cases, suggesting that it is justifiable to regard the functional studies as representative. It is clear that the abnormal side contributes little to the ventilation and uptake of oxygen. The evidence is that this is because of a grossly increased airway resistance, and it is safe to assume that the proportional contribution on exercise will be even less. An important functional question is whether the perfusion of the lung is reduced in keeping with the ventilation. The blood-gas studies and the local exchange ratios indicate that this is so. Any considerable excess of perfusion over ventilation would reveal itself by arterial desaturation, aggravated by exercise, and by a low local exchange ratio from the affected lung.

Little is known of the pathology of the condition, there being no post-mortem studies. Through the courtesy of Prof. J. Gough we have examined an affected lung removed at operation. The alveolar walls were thin but not grossly disrupted, and their elastic fibres were preserved. The pulmonary vessels were smaller than normal, and the large and medium bronchi had thin cartilages and were easily deformable. Some of the smaller bronchi showed chronic submucous inflammation.

These findings give little clue either to the mechanism of the obstruction or to its mode of origin. It is tempting to suppose that the thin bronchi collapse during expiration and so produce a valvular obstruction However, screening after bronchography shows no evidence of this; and such a mechanism should cause no hindrance to inflation by positive pressure, whereas our experiments demonstrate the contrary. Small shadows of the pulmonary artery are a feature of the radiographs, and these and the thin bronchi may represent either atrophy or hypogenesis. In either case it appears likely that the condition has been present for a considerable time and may have begun before growth was complete.

There does not appear to be much scope for treatment. In case 1 an attempt was made to deal with any obstruction by mucosal swelling that might exist. Hydrocortisone was mixed with water-soluble contrast medium and instilled under fluoroscopic control into the bronchi of the affected lung. Three such applications produced no benefit.

We feel that surgery is not indicated. There is no shunting of blood through the underventilated lung, and the normal ventilatory cost of exercise found in case 1 argues against excessive stimuli arising from the abnormal side. Functionally the patient is already pneumonectomised, and the abnormal lung is as satisfactory a space-filler as the surgeon can provide.

Summary

Four new cases of unilateral "emphysema" are described.

Functional studies indicate a severe non-valvular obstruction to the small airways on the affected side. The blood-flow through the lung is reduced in keeping with its ventilation.

Surgery is contraindicated.

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DIRECT-VISION PULMONARY VALVOTOMY DURING PREGNANCY

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IN October, 1956, a woman, aged 27, was referred to us because she had congenital stenosis of the pulmonary valve. She was three months pregnant. During her first pregnancy, two years before, she had become increasingly short of breath on exertion, but labour was uneventful. After the birth of this child shortness of breath continued and was so severe during the third month that she had difficulty in climbing a flight of stairs and could not adequately carry out her household duties. There was clinical and electrocardiographic evidence of considerable enlargement of the right ventricle. Radiologically her lungs were much undervascularised and there was a post-stenotic dilatation in the main pulmonary artery.

It was clear that, for pregnancy to proceed safely, pulmonary valvotomy should be performed. This could be achieved either by approaching the valve through the right ventricle, with an intact circulation, or by operating under direct vision through an opened pulmonary artery with a temporarily arrested circulation. In the latter event hypothermia would have to be used.

We could find no report of the combined use of circulatory arrest and hypothermia in pregnancy, though hypothermia alone had been successfully applied by Rowbotham et al. (1957). There is, however, experimental evidence that fœtal tissues withstand anoxia better than adult tissues.

The technical advantage of direct vision rather than blind valvotomy was thought to outweight any possible harm to the fœtus. Accordingly pulmonary valvotomy was performed under direct vision on Oct. 25, 1956.

Premedication with hyoscine gr. $^1/_{150}$ and chlorpromazine 25 mg. was given. Anæsthesia (by Dr. E. D. Wylie and Dr. C. Sanger) was induced with thiopentone 0·25 g., and intubation was done with the aid of suxamethonium chloride 100 mg. Respiration was maintained on oxygen and nitrous oxide and controlled with intermittent doses of tubocurarine. Blood-pressure, electrocardiograms, and œsophageal temperature were recorded.

Cooling was produced on the operating-table. A wet sheet covered the patient, and two fans at the foot of the table blew air over this. Sixteen ice-bags were laid on the patient, except over the præcordium. After one hour the cooling was stopped and the operation began. At the time the circulation was interrupted, the temperature had fallen from the preoperative 37·6°C (99·7°F) to 32·0°C (89·6°F). The operation lasted one and three-quarter hours. Warming began during the operation, as soon as the circulation was restored: it was done with an electric blanket, which had been placed beneath the patient before the operation.

The patient recovered consciousness one hour and a half after the end of the operation, when the temperature was 35·0°C (95°F). The temperature returned to normal five hours after the operation.

The operation was based upon that described by Swan et al. (1954).

A vertical incision was made over the sternum, and this was divided in the midline from the suprasternal notch to within ½ inch of the xiphoid process. The rib spreader then produced a good exposure of the heart and great vessels. The

pericardium was opened vertically. The pulmonary artery was much dilated in its main trunk, and its wall was firm between the fingers. A strong jet was palpable in the left anterolateral wall of the artery. A firm papilla was felt projecting into the artery from the right ventricle. The right auricle was very large.

The pulmonary artery was dissected free from the aorta, in order to allow a clamp to be placed across the distal end of the pulmonary artery. Looped tubes of polyethylene were passed round the superior and inferior venæ cavæ. The azygos vein was tied. A Pott's partially occluding toothed clamp was applied longitudinally to the main artery, and an incision ¾ inch long was made in the occluded part. Before the clamp was applied, two stay sutures were placed beyond the expected ends of the incision. The tubes round the venæ cavæ were tightened to occlude blood-flow, and forty-five seconds later a Crafoord non-crushing clamp was applied to the pulmonary artery. The Pott's clamp was removed, and the artery incision edges were held apart with forceps. The white firm funnel of the stenosed valve was lifted up with artery forceps, and three ½-inch incisions were made in it to shape approximately normal valves. Scissor blades separated in the valve showed the opening to be large. No infundibular stenosis was found.

The pulmonary-artery clamp was then removed, and blood flowed back into the artery. The superior vena cava was released, and the pulmonary artery then filled with blood from the right ventricle. At this time the Pott's clamp was replaced on the pulmonary artery to occlude the incision. The left index finger, placed in the transverse sinus, facilitated these manœuvres by keeping the arterial incision uppermost. The inferior vena cava was released, and the pulmonary artery incision was closed with two continuous strong silk sutures. There was complete circulatory arrest for three minutes. The heart slowed but did not stop and did not produce extra contractions. A basal drain was placed in each pleural space, and a blood-transfusion of one pint was given.

After operation there was no evidence of impairment of cerebral function and the pregnancy proceeded normally. Six months later the patient was delivered normally of a child which weighed 5 lb. 12 oz., and which was breast-fed. Both mother and child are now well.

Our thanks are due to Dr. B. Sutherland, of Bexhill-on-Sea, who referred the patient to us.

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CŒLIAC DISEASE WITH ATROPHY OF THE SMALL-INTESTINE MUCOSA

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FOR many decades, anatomical lesions of the small intestine in children with cœliac disease have been suggested by some authors and denied by others. Proof of such a lesion has never been obtained. In adults, by the method of taking biopsies via the oral route from the upper part of the small intestines (Shiner 1956), it has been shown that mucosal atrophy, confined mainly to the villi, was present in all of ten cases of idiopathic steatorrhœa thus investigated (Doniach and Shiner 1957, Shiner 1957a). Since then biopsy in a further three cases has given the same results. These changes were not found in nearly a hundred biopsies obtained from normal control cases, and from patients with diseases of the small and large intestines other than idiopathic steatorrhœa (Shiner 1957b). We thought that this investigation would be of interest in an untreated case of cœliac disease. This opportunity presented itself, and we now record the case-history of a boy with cœliac disease in whom small-intestine biopsy showed the same histopathological changes of the mucosa as is found in adult idiopathic steatorrhœa.

Case-report

A boy, whose birth-weight was 7 lb., was brought up on artificial-milk mixtures and weaned on to solids at about 6 months. His development was good, but his appetitie was always poor. He had a tendency to vomit and did not grow very much. He was constipated, but did have occasional diarrhœa. When he was 5½ cœliac disease was diagnosed at the Middlesex Hospital, and a low-fat gluten-free diet was advised; but he was not kept on it or taken back to hospital.

Fig. 1—Patient before treatment.

He continued as before with poor appetite, not growing much. His bowels were irregular and his abdomen remained larger than normal. His temperament was always good and cheerful. He was first seen at the Central Middlesex Hospital in February, 1957, aged 7 years 10 months. He was pale and definitely small and underweight for his age. His height was 41¾ in. (expected height 47 in.) and his weight 32 lb. (expected weight 55 lb.). His buttocks were very small though not obviously wasted. His abdomen was protuberant (fig. 1), but the liver was not palpable. His tongue was red and very smooth and shiny. He had been having intermittent bouts

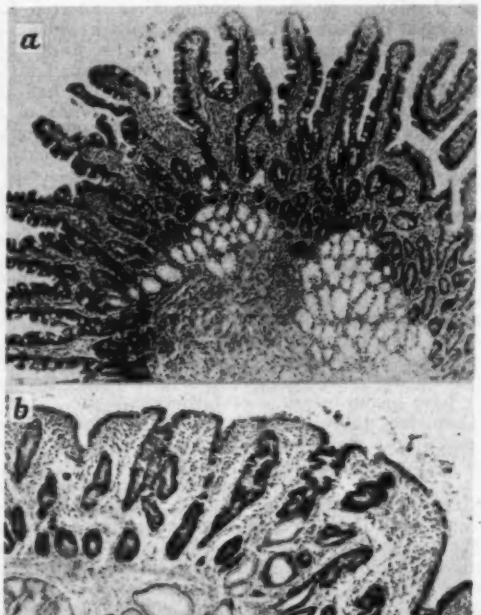

Fig. 2—Duodenal biopsy specimens: (a) normal adult; (b) cœliac child. (Hæmatoxylin and eosin × 55.)

of frequent bulky, pale stools, which were also frothy and offensive at times, but this subsequently varied considerably.

He had a mild hypochromic anæmia, with a normal erythrocyte-sedimentation rate and a negative tuberculin test. The glucose-tolerance curve was flat, and 52% of fat ingested was lost in the stools. Radiographs of chest and abdomen were normal, and radiographs of bones showed osteoporosis; barium-meal examination showed normal stomach and duodenum, but loss of the normal mucosal pattern in the small bowel, with dilatation, and clumping of barium. Duodenal biopsy showed mucosal atrophy; the duodenal juice was sterile and contained trypsin.

Mild idiopathic cœliac disease was diagnosed, and a gluten-free diet started, with adequate extra vitamins. The response to treatment was satisfactory. After 5 weeks he gained 9 lb. in weight, and was passing one stool a day, which on most occasions appeared quite normal.

Biopsy

The adult biopsy tube (Shiner 1956) was used. After the child had gargled with 1% amethocaine solution, the head end of the tube was introduced with ease. He was then transferred to an X-ray screening table and the proximal part of the tube directed through the pylorus by manual palpation on his abdomen under direct fluoroscopic control. Four biopsies were taken from the second and third part of the duodenum, keeping the suction-pressure as low as 2 in. Hg. This is important because it reduces bleeding to a minimum and makes biopsy safe in an already thin mucosa. The child suffered no ill-effects from the procedure, as was the case in all the adults in whom this technique was used; there were no complications.

The four specimens were about 3 mm. in length and included full-thickness mucosa, muscularis mucosæ, and a varying amount of submucosa. Brunner's glands were found in three of the specimens. Compared with the normal (fig. 2a), the most striking change was that the villi were virtually absent (fig. 2b). This gave the appearance of a smooth surface to the mucosa, interrupted only by the dipping down of crypts of Lieberkühn. The surface cells were of the low columnar variety, showing flattening of the cells, irregularity of nuclei and poor staining properties. The lamina propria was increased in thickness, and showed clear spaces possibly caused by œdema. The glands of Lieberkühn appeared normal, and mitosis was abundant within the glandular epithelium. Cellular infiltration was not excessive, and of the usual variety—namely, by lymphocytes, plasma cells, and a few eosinophils. The muscularis mucosæ revealed no abnormality and was pierced in places by Brunner's glands. These glands, occupying most of the submucosa, showed cystic dilatation with flattening of their cells. Similar changes were observed in a laparotomy biopsy specimen from a child aged 14 years with idiopathic steatorrhœa.

5 weeks after the gluten-free diet had been begun, repeat biopsies were taken from about the same area of the duodenum. These showed changes identical with those found previously, thus confirming the original findings and showing that no change had so far resulted from treatment.

Discussion

Mucosal atrophy, confined mainly but not entirely to the villi, has been observed in idiopathic steatorrhœa, and now in this case of cœliac disease. This change was not found in the secondary varieties of steatorrhœa. It is a constant finding in the upper part of the small intestines, and the duodenum is affected in the same way as the upper jejunum. Evidence of patchy atrophy in cases of idiopathic steatorrhœa along the rest of the small intestines was obtained from two cases in whom biopsies were possible at laparotomy and by the oral routes. One of these patients subsequently came to necropsy and the patchy nature of the atrophy was confirmed. Paulley (1957) reported a case of idiopathic steatorrhœa in which he also observed patchy atrophy, both macroscopic and microscopic.

Loss of surface area could well account for incomplete absorption not only of fats but also of carbohydrates, iron, vitamins, and other substances. In addition, histochemical techniques may reveal a specific cellular defect to explain the malabsorption. Some authors consider cœliac disease to be a hereditary and familial disease (Andersen and Di Sant' Agnese 1953, Ebbs et al. 1950), and the finding of an anatomical defect in the small-intestinal mucosa supports this theory. Furthermore, the similarity of the lesions found in cœliac disease and in adult idiopathic steatorrhœa suggest that they are one and the same disease, though the history does not always date back to childhood (Cooke et al. 1953).

Summary

Cœliac disease in a boy of 8 years was investigated by small-intestinal biopsy via the oral route. We believe this is the first time such a biopsy has been performed. The specimens showed villous atrophy similar to that found in all of thirteen cases of adult idiopathic steatorrhœa. These changes may be of primary importance in the ætiology of the disease; they may be due to a hereditary trait; and cœliac disease and adult idiopathic steatorrhœa may be one and the same disease.

We wish to thank Dr. F. Avery Jones and Dr. V. Percic for their help and assistance, and Dr. E. W. Hart, for permission to include a few details of the earlier findings at the Middlesex Hospital. We are also grateful to Mr. J. E. Mayhew for the histological sections, and to Miss Yvonne Vincent, Mr. I. T. Hinton, and Mr. A. G. Booker for the photographs.

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Reviews of Books

The Human Sum

Editor: C. H. Rolph. London: Heinemann. 1957. Pp. 232. 18*s*.

The origins of this interesting if rather confused book lie with the Family Planning Association. It is a kind of *Festschrift* for the birth-control movement, in which papers on the demographic and political aspects of overpopulation, by Dr. Julian Huxley and Lord Russell, are juxtaposed with some alarming sociological studies of the evils of unplanned families, past and present, a discussion of the Christian theology of marriage, and a number of other equally diverse contributions. The intention of the whole is excellent, and so is the execution of most of its parts (a study of the "unwanted" at school, by Edmund Blishen, in particular). Some of the other sociological comment suffers a little as science because of the requirements of its brief: not all working-class families of the past century were problem families, nor was untrammelled fertility the only handicap on the remainder; and more might perhaps have been said of the social forces which make children unwanted. But the emphasis is justifiably placed on the evil of compulsory childbearing and the wish of the individual man, and specially woman, to control this aspect of their life.

In fact, the gravest criticism of the articles in this book which deal specifically with contraception as a social tool is not that they overplay the problem but that they argue as if the methods now currently available were adequate to relieve, in whole or in large part, the troubles of those who most need help. This optimism lies some way from the truth, and the discrepancy is greatest for the already burdened, the adolescent, the highly fertile, and the unintelligent—all of whom are encouraged to expect more of contraception than it can at present provide. What will satisfy the demographer by way of reduced fertility will not content the individual patient. Some of the research possibilities are reviewed here by Dr. A. S. Parkes; and improvement of housing

conditions may do much to render current methods more certain.

Of particular medical interest is J. L. Hodson's discussion of abortion. Dealing both with the sociology of illegal abortion and also with the interpretation placed on the law by judges and doctors, he argues in favour of changes in the law and a more courageous interpretation by doctors of the law as it now stands. Neither he nor the authorities he quotes specify the exact change in law they have in mind to meet the situation. The issue is passed fairly to the reader: abortion is in any case a concern of the family planner only in that it reflects our neglect in helping individuals to control their fertility by better means. Mr. Hodson's essay shows an awareness of the complex problems raised by the patient seeking abortion that will command medical respect. Though the subject is one doctors tend to avoid, any proposal for reform of the law will rightly provoke many of them to controversy. Certainly, the facts alone suggest that dignified silence is not enough, especially since it seems clear that the chief determinant at the present time between surgical and unqualified interference with pregnancy is the ability to pay.

Clinical Electrocardiography

MANUEL GARDBERG, M.D., clinical associate professor of medicine, Louisiana State University School of Medicine, New Orleans. New York: Paul B. Hoeber. London: Cassell. 1957. Pp. 315. 95*s*.

THE cardiologist, whose knowledge of electrocardiography has been gained by experience, can often interpret electrocardiograms better than the theoretical electrocardiographer, especially when the clinical state of the patient is known. It is probably best, therefore, for the medical student to avoid much theoretical electrocardiography, since the subject is lengthy and specialised: he can learn all he needs from the simple principles he was taught during his course in physiology and by seeing a few patients with the commoner abnormalities. The young cardiologist, however, wants to base his knowledge on the principle of electrocardiography, and, if he can afford it, could do no better than study Dr. Gardberg's book. Of moderate size and beautifully produced, it is well illustrated with electrocardiograms and the idealised drawings at present so popular. Vectors are given their most useful function here in displaying the principles of electrocardiography. The ventricular gradient is perhaps overemphasised by this school, which pioneered the concept after its introduction by Wilson; but on the whole the balance is extremely sound. The bulk of the book is devoted to coronary disease rather than to rare arrhythmias, which seem to fascinate so many electrocardiographers.

The Visual Pigments

H. J. A. DARTNALL, PH.D., F.R.I.C., head, visual research division, ophthalmological research unit (Medical Research Council), Institute of Ophthalmology, London. London: Methuen. 1957. Pp. 216. 30*s*.

WHEN an active research-worker turns from his laboratory to write a book about his subject, its appearance is awaited with great interest. Dr. Dartnall is to be congratulated on the first authoritative monograph of this century on visual pigments. It has been attractively produced as one of the Methuen series on biochemical subjects.

He has taken much trouble to understand and present fully the contributions of other workers in this field, without over-emphasising his own. This exhaustive but not exhausting review of the literature will be a very useful reference volume for many years to come. Dr. Dartnall has done much more than review the literature: he has also taken care to provide the necessary basic background of physics, photochemistry, and biochemistry needed to follow the latest developments in this branch of retinal physiology. Thus, the book becomes of value to the student exploring this subject for the first time.

There are several active groups at work on retinal physiology, and progress is so rapid that controversies are certain to arise. Much of the book is devoted to a careful historical and factual account of these controversies. The various attitudes held by the differing parties are fairly stated, and this lets the reader join in some of the intellectual excitement so often associated with fundamental scientific research.

The final answers to these many problems can, however, be settled only in the laboratory. This book will certainly attract more workers into this interesting research; and they will have much to do before the second edition of this book can be written.

Atlas of Tumor Pathology

Tumors of the Eye and Adnexa. (Fascicle 38.) ALGERNON B. REESE, M.D., professor of ophthalmology, College of Physicians and Surgeons, Columbia University. 1956. Pp. 205. $2.

Tumors of the Pituitary Gland and Infundibulum. (Fascicle 36.) JAMES W. KERNOHAN, M.D., Sections of Pathologic Anatomy and Surgical Pathology, Mayo Clinic; GEORGE P. SAYRE, M.D., Section of Pathologic Anatomy, Mayo Clinic, Rochester, Minnesota. 1956. Pp. 81. $1.

Tumors of the Kidney, Renal Pelvis and Ureter. (Fascicle 30.) BALDUIN LUCKE, M.D., late professor of pathology, University of Philadelphia, Pennsylvania; HANS G. SCHLUMBERGER, M.D., professor of pathology, Ohio State University, Columbus, Ohio. 1957. Pp. 208. $2.25.

Armed Forces Institute of Pathology, Washington, D.C.

LIKE their predecessors in this series, these three loose-leaf volumes are well produced and notable for their excellent illustrations and low cost.

Dr. Reese's section deals with a part of the body where few pathologists dare to tread. For his material he draws principally on the Institute of Ophthalmology, New York, and so is in a position to review 17 cases of retinoblastoma and 271 instances of melanoma of the uveal tract. The valuable information he gives includes statistics on prognosis; and particularly interesting are details of the timing of metastasis and the argyrophil-fibre content of melanomas.

At the Mayo Clinic pituitary adenomas constitute 12% of all intracranial tumours, but this high figure is doubtless due to surgical selection. Dr. Kernohan and Dr. Sayre base their useful report on 565 chromophobe adenomas, 40 eosinophil adenomas, and 132 adamantinomas.

Dr. Lucke lived to write only the introduction to his section and to select the illustrations, but Dr. Schlumberger has kept to the original plan with commendable success. The abundant material reviewed comes from the Philadelphia and Columbus Hospitals and from the Armed Forces Institute of Pathology. The admirable section on adenocarcinoma of the kidney includes useful statistics on metastasis and survival-time.

Histological Technique (3rd ed. London: Oxford University Press. 1957. Pp. 343. 30*s*.).—After a lapse of ten years a new edition has appeared of this old-established book of laboratory practice. It differs from the former editions in being the product of two authors, although the untimely death of Dr. Harry Carleton meant that the final phases of preparation fell to Dr. R. A. B. Drury, who had already contributed new chapters on histopathology and bacteriological methods. Despite the introduction of new material in the text, the number of pages has been reduced, and at its present cost the book is very good value. Its scope remains wide: there is information of use to those in biology and pathology laboratories, and, while other books are concerned with advanced and specialised histological techniques, there is no doubt that this one will continue to be the stand-by for student and junior technicians, as well as a convenient reference for the clinical pathologist and histologist who has a technical histological problem to solve. It is significant that the book continues to be among the few suggested in the syllabus of the Institute of Medical Laboratory Technology as suitable for study for their examinations.

Preventive Medicine and Public Health (3rd ed. London: H. K. Lewis. 1957. Pp. 309. 25*s*.).—The first edition of Prof. Fred Grundy's book was written because he thought there was need for a readable introduction to these subjects (and the appearance of a third edition shows that he was right). He was at pains to explain that the book was not in any sense a textbook of hygiene and sanitary practice. Some of the text and illustrated material were taken from his earlier book, *The New Public Health*, which was intended for midwives, health visitors, and other social workers. A new feature of this edition is the inclusion of a short list of suggestions for further reading, designed to help the student who wishes to delve more deeply in selected subjects.

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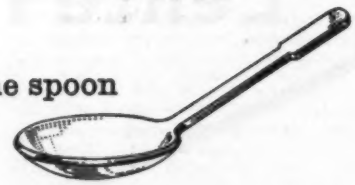

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THE LANCET

LONDON: SATURDAY, NOVEMBER 2, 1957

Anæmia after Gastrectomy

ANÆMIA has been recognised as a late complication of gastrectomy for many years, but published observations have shown much variation in its incidence. Nowadays, when surgeons perform the operation for peptic ulcer more often than they did ten years ago, and even do a total gastrectomy when necessary, the incidence seems to be increasing. It is not surprising, therefore, that there has been a good deal of research into the causes of this anæmia and the possibility of preventing it. MACINTYRE and STENT [1] have lately reviewed 100 patients who had had a partial gastrectomy for peptic ulcer at times varying from five months to ten years before they were investigated. Out of this group of 100, 44 were found to have significant anæmia. In 14 the anæmia was normochromic and normocytic and the hæmoglobin levels were between 11·7 and 12·6 g. per 100 ml.; in 19 patients the anæmia was hypochromic but the mean corpuscular volume was normal, and the hæmoglobin was between 7·9 and 12·0 g. per 100 ml.; 9 patients with hæmoglobin between 6·9 and 11·7 g. per 100 ml. had a hypochromic microcytic picture. Macrocytic anæmia was found in only 2 patients; 1 had a normoblastic marrow, and in the other (a man of 69 who had developed anæmia fifteen months after a Billroth-I gastrectomy) the marrow was megaloblastic; his hæmoglobin level was 11·3 g. per 100 ml. and he responded well to vitamin B_{12}. PAULSON and HARVEY [2] investigated the blood changes in 27 patients who had had total gastrectomy, most of them for gastric carcinoma. They noticed a definite pattern in the development of anæmia. Within two to three months of the operation an iron-deficiency anæmia appeared as the result of blood-loss; and the fæcal occult-blood test was always positive. PAULSON and HARVEY thought the blood was being lost from inflamed and eroded areas at the anastomotic sites, some from the lower œsophagus but principally from the jejunum. This anæmia responded to ordinary treatment with oral iron. The next stage came about two years after operation when macrocytosis appeared, to be followed by anæmia; and then after three to five years, provided the patient lived that long, anæmia became associated with megaloblastic changes in the marrow—a stage which responded to vitamin B_{12}.

BADENOCH et al.[3] found 6 patients who had a megaloblastic anæmia following partial gastrectomy. By testing with vitamin B_{12} labelled with ^{60}Co they were able to show that 5 of the patients were failing to absorb vitamin B_{12}, and that this failure could be corrected by giving gastric intrinsic factor. In other words, these patients had developed a pernicious-anæmia syndrome, although they should have had enough gastric tissue left to prevent this. BADENOCH et al., by using WOOD's gastric biopsy tube,[4] were able, with some difficulty, to get biopsy specimens of the remaining gastric mucosa of some of the patients, and the specimens did show an atrophic change like that found in pernicious anæmia. These 5 patients were all over 50 years old at the time of the operation; they all had gastric ulcers, and had had persistent dyspepsia for years. BADENOCH et al. suggest that persistent gastritis leading to atrophy of the gastric mucosa might explain why these patients, unlike the majority, had megaloblastic anæmia after partial gastrectomy. MACLEAN [5] at Minneapolis has taken the idea a step further. At his hospital patients who have had a gastrectomy are reviewed annually, and he was able to screen 1550 patients who had had various types of gastrectomy. Megaloblastic anæmia was found in 9, and all responded to parenteral vitamin B_{12}. A patient who was thoroughly investigated was found to have defective absorption of vitamin B_{12}, and the mucosa of the resected stomach was said to be of "poor quality"; it showed "chronic cellular infiltration, intestinalisation of the mucosa, absence of parietal and chief cells and atrophy of all layers." Examination of the gastric mucosa resected from the other 8 patients showed the same picture. MACLEAN considers that it should thus be possible by examining the resected stomach to predict which patients are likely to develop megaloblastic anæmia. If the mucosa is healthy, the patient will not develop megaloblastic anæmia provided a portion of normal fundus equal to about 10% of the original *total* stomach mucosa is left.

But the commoner anæmia that affects patients who have had partial gastrectomy is an iron-deficiency anæmia, and, oddly enough, we are still unsure about its cause. Sometimes an iron-deficiency anæmia appears in the first postoperative weeks; but this, as PAULSON and HARVEY pointed out, is due to blood-loss around the anastomotic zones. Later (usually some years later) an insidious iron-deficiency anæmia ensues; and this has often been attributed to disturbance of iron absorption from the small intestine. SMITH and MALLETT [6] studied the absorption of radioactive iron (^{59}Fe given as ferrous sulphate) in patients who had had a partial gastrectomy up to five years previously. They found no gross impairment of iron absorption; on the contrary, those patients who had become anæmic "were capable of augmenting iron uptake in a manner characteristic of iron-deficiency from chronic hæmorrhage." They concluded, therefore, that continuing occult blood-loss from the alimentary mucosa was the cause of the anæmia. This would fit in with the well-known response to oral iron in most of these anæmic patients. Attempts have been made to examine the jejunal mucosa below the anastomosis to see whether this showed any significant changes. PAULSON and HARVEY [2] examined a biopsy specimen from a patient who had a macrocytic blood-picture and found atrophy of the mucosa resembling that seen in the stomach in pernicious anæmia. BADENOCH et al.[3] obtained 2 specimens of jejunal mucosa through a gastric biopsy tube, and they reported no abnormality. BAIRD and DODGE [7] have lately recorded the results of jejunal biopsies taken

1. Macintyre, H. W., Stent, L. *Brit. J. Surg.* 1956, **44**, 150.
2. Paulson, M., Harvey, J. C. *J. Amer. med. Ass.* 1954, **156**, 1556.
3. Badenoch, J., Evans, J. R., Richards, W. C. D., Witts, L. J. *Brit. J. Hæmatol.* 1955, **1**, 339.
4. Wood, I. J., Doig, R. K., Motteram, R., Hughes, A. *Lancet*, 1949, i, 18.
5. MacLean, L. D. *New Engl. J. Med.* 1957, **257**, 262.
6. Smith, M. D., Mallett, B. *Clin. Sci.* 1957, **16**, 23.
7. Baird, I. McL., Dodge, O. G. *Quart. J. Med.* 1957, **26**, 393.

with WOOD's biopsy tube in 31 patients who had had a partial gastrectomy. In 17 an iron-deficiency anæmia had developed at various times from two to nine years after the operation : in 14 of them the jejunal mucosa was normal, and in 2 it was œdematous ; atrophy was present in only 1 patient who, five years after operation, had a severe iron-deficiency anæmia with hæmoglobin of 42%, koilonychia, a sore tongue, and angular stomatitis ; but 2 other equally anæmic patients had normal mucosa. 9 patients had no anæmia, but hyperæmia with or without œdema of the mucosa was recorded in 2 of them and jejunitis in 1. Among 5 patients with steatorrhœa following gastrectomy, 1 had an atrophic jejunal mucosa and 1 had jejunitis. No correlation was found between the time since operation and the appearance of jejunal changes. These results are somewhat conflicting, and BAIRD and DODGE cautiously conclude that iron-deficiency anæmia and steatorrhœa after partial gastrectomy "cannot regularly be attributed to structural alterations in the jejunal mucosa."

These reports remind us that anæmia is a complication to be reckoned with in partial and total gastrectomy. Anæmia after total gastrectomy is easy to understand, since the operation removes so much of the mucosa that secretion of the intrinsic factor essential for the absorption of vitamin B_{12} is severely reduced.[8] The cause of anæmia after partial gastrectomy is less clearly defined ; continuing blood-loss from mucosa exposed to an unusual environment, perhaps gastritis leading to loss of function of secreting cells, and, occasionally, jejunal abnormalities, may all be responsible. Fortunately the treatment is straightforward ; the iron-deficiency anæmia mostly responds to oral iron, and the occasional megaloblastic anæmia to parenteral vitamin B_{12}. Prevention of the anæmia is certainly important and is best secured by arranging for an annual blood-count for patients who have had this operation.

Expectorants Old and New

Since ALSTEAD[9,10] suggested that the expectorants commonly given by mouth did not increase the volume of sputum in chronic bronchitis, their value has been questioned and their popularity has waned. An expectorant is a substance which assists in the removal of secretion or exudate from the respiratory passages : it may do so by producing an irritant cough, by increasing secretion from the respiratory glands, thereby making the sputum more fluid and less tenacious, or by a direct action on the sputum when given by aerosol inhalation. Drugs such as ammonium chloride, iodides, and ipecacuanha are thought to make the sputum less viscid by increasing the output of fluid in the respiratory tract.[11] Whereas the effect of these substances by mouth may not be impressive, sodium iodide intravenously in doses of 1 g. causes a big increase in the volume of the bronchial secretion.[12] Steam, detergent solutions (such as 'Alevaire'), and enzymes (such as trypsin and deoxyribonuclease) are given by aerosol inhalation to reduce the viscidity of the sputum by a direct physical or enzymatic action.

There are two distinct types of sputum, which have different chemical and rheological properties. Sputum which is clear and gelatinous is highly viscid and adhesive ; it consists of a mucoprotein gel which normally contains water. The more water the gel contains the less viscid the secretion becomes, and when it loses water through drying its viscosity increases. Sputum which is opaque and yellow is less viscid and adhesive than mucoid sputum, and it consists of coarse bundles of deoxyribonucleoprotein and pus cells. A specific deoxyribonuclease (streptodornase) may be given by aerosol when the secretion is purulent,[13] but no mucinase acts specifically against mucoid sputum ; this is countered by aerosol inhalation of a fine water or saline mist to reduce viscidity by hydrating the gel, or by aerosol inhalation of trypsin.[14-16] Trypsin is inactive in purulent sputum,[15] since pus contains trypsin inhibitors.

When the sputum is viscid, the cough reflex is inactive, or there is respiratory paralysis, sputum is retained in the lungs ; under these circumstances it may impede ventilatory efficiency and cause death from asphyxia, occlude a major bronchus and cause massive or lobar collapse, or by interference with ciliary activity in the smaller bronchi give rise to segmental collapse and diffuse bronchopneumonia. In the bedridden and aged, bronchitics, patients who have had abdominal operations, and those with paralysed respiratory muscles, problems in the treatment of sputum retention loom large. We have published recently papers dealing with certain aspects of these problems. Dr. PALMER[17] found that alevaire (which contains a detergent, sodium bicarbonate, and water) by aerosol inhalation facilitated the expectoration of viscid mucoid sputum in chronic bronchitics. This was shown to be due probably to simple hydration of the viscid sputum by the water contained in the aerosol, rather than to an effect from the detergent or the sodium bicarbonate. During a week's aerosol inhalation there was no constant reduction in the viscosity of morning specimens of sputum, but the viscosity of the sputum produced immediately after an hour's aerosol inhalation was considerably reduced. Dr. FORBES and Dr. WISE[18] gave patients with chronic chest diseases various expectorants by mouth and by aerosol inhalation. All sputum expectorated in each twenty-four-hour period was collected ; its volume was measured and the viscosity of the total specimen determined. They found no constant reduction in viscosity with any of the substances tried—probably because, as PALMER's work suggests, changes in viscosity are very transitory, and can be demonstrated only immediately after the aerosol inhalation.

In a further paper Dr. HARWOOD STEVENSON and Dr. KINNIER WILSON[19] discuss their experience of the management of respiratory infection in the chronic stage of poliomyelitis. They advocate chemotherapy, assisted coughing, and postural drainage, aided by aerosol inhalation of trypsin and isoprenaline, and at times oral promethazine. Treatment by assisted

8. Callender, S., Turnbull, A., Wakisaka, G. *Clin. Sci.* 1954, **13**, 221.
9. Alstead, S. *Lancet*, 1939, ii, 932.
10. Alstead, S. *ibid.* 1941, i, 308.
11. Basch, E. P., Holinger, P., Poncher, H. G. *Amer. J. Dis. Child.* 1941, **62**, 1149.
12. Baker, J. M., Roettig, L. C., Curtiss, G. M. *Ann. Surg.* 1951, **134**, 641.
13. Armstrong, J. B., White, J. C. *Lancet*, 1950, ii, 739.
14. Limber, C. R., Reiser, H. G., Roettig, L. C., Curtiss, G. M. *J. Amer. med. Ass.* 1952, **149**, 816.
15. Unger, L., Unger, A. M. *ibid.* 1953, **152**, 1109.
16. Vargà, C., Wild, J. *Amer. J. Dis. Child.* 1953, **86**, 273.
17. Palmer, K. N. V. *Lancet*, 1957, i, 611.
18. Forbes, J., Wise, L. *ibid.* Oct. 19, 1957, p. 767
19. Harwood Stevenson, F., Kinnier Wilson, A. B. *ibid.* Oct. 26, 1957, p. 820.

coughing and postural drainage and by aerosol inhalation of isoprenaline has been shown to be a very effective method of preventing the retention of secretion and subsequent pulmonary collapse after abdominal operations—a combination of physiotherapy and isoprenaline being more effective than either given singly.[20] HARWOOD STEVENSON and KINNIER WILSON are impressed by the value of trypsin, which they suggest helps to liquefy the sputum. A similarly favourable impression has been reported by others.[14-16] It is by no means certain, however, that this effect can be ascribed to the proteolytic action of trypsin. LIMBER et al.[14] report that inhalation of trypsin results in coughing and direct stimulation of the respiratory passages with resultant secretion of fluid. Also, the beneficial effect from hydration of the mucoprotein gel by the water in the aerosol mist may be of greater importance than the proteolytic action of trypsin. FORBES and WISE [16] remark that trypsin probably acts mainly as a respiratory-tract irritant, and that its chief virtue is that it stimulates coughing. Apparently, therefore, it cannot yet be confidently stated that trypsin, by virtue of its proteolytic action, is of value in the treatment of patients with mucoid sputum.

20. Palmer, K. N. V., Sellick, B. A. *ibid.* 1953, i, 164.

Unfortunately trypsin gives rise to side-reactions, including dyspnœa, fever, hoarseness, and nasal and eyelid irritation[14 16 21]; and FARBER et al.[22] suggest that with inhaled trypsin irritative effects are so common as to outweigh any possible advantages. Furthermore FARBER et al.[21] have found pronounced alteration of the epithelial cells (atypical metaplasia and dyskeratosis) in sputum smears in patients receiving trypsin alone and trypsin with deoxyribonuclease by inhalation. These changes persisted in the sputum six months after the inhalations were discontinued. Obviously the effect of these enzymes on the tracheobronchial tree should be further evaluated.

Thus, in the management of retained secretion in the lungs, the treatment of choice would seem to consist in postural drainage with assisted coughing combined with the aerosol inhalation of a water-mist containing an antispasmodic such as isoprenaline, adequate fluid intake by mouth, and the avoidance of drugs such as morphine and pethidine which increase sputum viscosity.[23]

21. Farber, S. M., Pharr, S. L., Trant, H. F., Wood, D. A., Gorman, R. D. *Lab. Invest.* 1954, 3, 33.
22. Farber, S. M., Gorman, R. D., Wood, D. A., Grimes, O. F., Pharr, S. L. *J. thorac. Surg.* 1954, 27, 45.
23. Blanshard, G. *Arch. Middx Hosp.* 1955, 5, 222.

Annotations

P.A.S. AND THE PATIENT

THE need for a long period of chemotherapy in pulmonary tuberculosis is now accepted, and the aim in most patients with active lesions is to maintain treatment for two years or more. On the other hand, many months of bed rest is now seldom necessary. Even patients with extensive disease can usually be allowed up after about two months, and those who have an operation can be prepared for it and recover from it more rapidly than before. Patients with less widespread lesions are probably best admitted to hospital for a few weeks so that the initial difficulties of drug therapy can be overcome, and to accustom them to the daily routine of administration. This arrangement has many advantages for the patient and it is a relatively cheap form of treatment which has, in the main, proved quite surprisingly successful. Thus, a group of patients treated in 1955–56 for the most part by ambulatory methods did just as well as a broadly comparable group of 1954–55 patients who had spent six times as long in bed.[1] Clearly much of this success is due to the effectiveness of chemotherapy given under well-managed outpatient conditions.

In the early stages, particularly when the patient is admitted to hospital for a short period, it is often the custom to give streptomycin with either or both of the other drugs; when the patient is being treated as an outpatient streptomycin may be continued for a time, but it is usual to change before long to purely oral chemotherapy. Certain disadvantages then arise, mainly because of the bulk of *p*-aminosalicylic acid (P.A.S.) that has to be given and its unpleasant side-effects. Unfortunately, P.A.S. is a gastric and intestinal irritant, affecting some patients more than others, and its long-continued use may involve discomfort that becomes intolerable; nausea, anorexia, looseness of the bowels, and gastric and intestinal flatulence can be troublesome. In an article on p. 871 Dr. Dixon and his colleagues point out how the success of P.A.S. therapy has always been threatened by these tiresome toxic effects; and they have found by testing patients' urine that only 50% of outpatients were adhering strictly to their P.A.S. schedule. This disturbingly low proportion will no doubt stimulate other chest physicians to examine more closely their outpatient chemotherapy. In doing so it would be specially valuable to elicit the reasons why a particular patient is not taking his P.A.S., so that something can be done to improve matters. Some physicians may feel that a careful analysis of the reasons is essential before the advice of Dr. Dixon and his colleagues to abandon the routine use of P.A.S. in outpatients is widely accepted, particularly since the long-continued administration of streptomycin in older patients is apt to cause labyrinthine disturbance. Oral chemotherapy, even with its known handicaps, is often successful; and it is also convenient and cheap—a year's supply of P.A.S. and isoniazid, even in cachet form, costs less than a week's stay in hospital. Nor has the taking of drugs irregularly been shown to produce resistance when they are combined in one cachet or powder; it may do, but the results of treatment seem too good for resistance induced in this way to be at all common. Dr. Dixon and his colleagues refer to unexpected bacterial resistance revealed during relapse, but they do not assess the extent of this danger. Further inquiry might well reveal that when the drugs are given in combined form resistance is less likely to develop.

In determining why P.A.S. is not taken as prescribed, simple matters should not be overlooked. Some patients, even after instruction, will be found to be taking the drugs *before* meals; others find the four-times-a-day schedule awkward in practice, and there seems a good case for changing to twice or at most thrice daily routines; giving the drugs four times a day usually means that the whole daily dose is taken during one half of the twenty-four hours and none during the other half. It seems more logical to have two peak periods twelve hours apart—e.g., four 1·5 g. P.A.S.-isoniazid cachets twice a day (after breakfast and the main evening meal) instead of two four times a day. This would also get over the difficulty some patients have in finding a suitable opportunity to take the drugs during the day; the drugs could be kept at home, and wife, husband, or parent could help to see that they were taken regularly. Moreover, in patients who have recurrent toxic symptoms the possibility of allowing relief periods of several days should be considered; many such patients resort to these gaps anyway, though they may not always admit to it, hence accounting for a proportion

1. Wynn-Williams, N., Young, R. D. *Tubercle*, 1957, 38, 333.

of those who give a negative ferric-chloride test. Before they leave hospital patients should be established on the same regime they will be expected to follow as out-patients, so that "teething" difficulties are overcome beforehand; and each patient should be quite clear how to obtain an additional supply when his stock of drugs is exhausted.

The Hammersmith investigation suggests that the development of drug resistance is due in part to mismanagement of chemotherapy by patients; but it is still true to say that the vast bulk of resistant organisms have resulted from the giving of either one drug alone or drugs in a combination rendered ineffective because resistance to one had already developed. Doctors have been responsible for more drug resistance than patients.

INTERNATIONAL CLASSIFICATION OF DISEASES

THE seventh Revision Conference of the World Health Organisation recommended some changes in the *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death*,[1] of which the previous edition appeared nine years ago.[2] The first volume of the new edition has now been published; by international agreement it will replace the previous edition on Jan. 1, 1958. Its purpose is to enable data about illness and causes of death to be coded easily for statistical purposes.

LIVER FLUKES IN MAN

MAN is seldom infected by the liver flukes of sheep and cattle; but from time to time conditions favour the infection of people living in agricultural areas. The flukes may then cause either no symptoms at all or illnesses ranging from the mild to the fatal. The flukes concerned are *Fasciola hepatica* and the smaller lanceolate fluke, *Dicrocœlium dendriticum*. All over the world, *F. hepatica* causes liver-rot of sheep and cattle, but it has several other final hosts—other ruminants, rabbits, horses, pigs, dogs, elephants, and man. The human disease is also apparently world wide, and the number of cases recorded probably amounts to about 300, a third of which were diagnosed in Cuba in 1948. *D. dendriticum* also infects many hosts, but human infections are less common.

In the familiar life-history of *F. hepatica* the egg is passed out in the fæces of the final host, and liberates a first larva (miracidium), which enters an air-breathing aquatic or amphibious snail, the species depending on the country. After a succession of larval phases, the cercaria leaves the snail to encyst on grass or aquatic plants, and is swallowed by the final host when it eats these plants. The final host can be infected only through the mouth. Man usually, but not always,[3] infects himself by eating watercress grown in water contaminated by the fæces of one or more of the final hosts, and in which the snails are living. The cercariæ of *D. dendriticum*, however, after leaving the snails enter ants; and the final host can only infect itself by eating the infected ants.

Most outbreaks of human liver-fluke infection in France have sprung from infected sheep[4]; but the much more extensive outbreak in eastern France in 1956–57, now described by Coudert and Triozon,[5] is ascribed to infected cattle. Ten times as many cattle as sheep are slaughtered in the area, and in 1956 the slaughtered cattle were infected with flukes. Probably the humid summers of 1955 and 1956 favoured the multiplication and survival of the snail intermediate hosts and the cercariæ. This course of events is typical of outbreaks of liver-rot of cattle and sheep. During the summer of 1956, all the patients had eaten either watercress growing wild in streams or watercress bought in the market. In many cases, cattle grazing next to the watercress beds were found to be passing eggs of *F. hepatica*; and the streams with wild watercress invariably contained the lymnæid snails.

In one patient's family, his wife and 4 children had no symptoms, but all had eosinophilia and a positive intradermal reaction, and all but 1 were passing eggs in their fæces. The patient had collected a lot of watercress and given it to his relations. Of 17 people infected, 15 remained in good health; and 13 of the 17 were passing fluke eggs. Man may thus harbour *F. hepatica* without apparent harm, even when he is passing several dozen eggs in each gramme of fæces. These carriers, however, are in danger of cholangitis and blocking of the bile-ducts.

The symptoms and signs in the recent French outbreak were the usual ones—pain in the liver, with or without enlargement, fever lasting several weeks, asthenia, and loss of weight. Some patients had a cough, and the sputum contained eosinophils. Others had urticaria or œdema. The disease was often mistaken for influenza or paratyphoid. Most of the cercariæ migrate direct to the liver across the peritoneal cavity, but others may be carried to unusual sites, where they very often die. Aberrant flukes of this kind have been found in subcutaneous cysts, in the brain and lungs, and around the eyes. In the second phase of the disease the flukes settle in the bile-ducts; their suckers may cause damage leading to bacterial cholangitis and blocking of the bile-ducts.

In this outbreak anæmia was uncommon; and the white-blood-cell count varied. Eosinophilia was the most constant feature; the eosinophil-count generally ranged from 25% to 74%, though in a few patients it was only 10–15%. Intradermal tests with a specific lyophilised antigen were nearly always positive, the reaction appearing within thirty minutes and extending next day to a large erythematous area. The diagnosis can be confirmed by finding the eggs of the flukes, but they do not appear in the intestinal contents until at least three months after infection. Examination of fæces for eggs was negative in about half Coudert and Triozon's patients. Examination of bile obtained by duodenal intubation might disclose the ova at an earlier stage, when treatment is more effective. The usual methods of concentrating fæcal samples may fail to identify fluke eggs, but flotation of eggs on a solution of potassium iodomercurate,[6] which has a specific gravity of 1·44, gave good results. It is important to distinguish eggs derived from infected livers that the patient has eaten; they are usually not coloured with bile and are in various stages of development.

No specific treatment is known, but emetine hydrochloride gave good results in the French outbreak, especially when administered early. Most patients seemed to be cured in this way, though half of them needed two courses of 10–15 injections. The only effective prophylaxis is not to eat infected plants on which cercariæ may have encysted, and to suspect watercress not grown under proper supervision.

DIAGNOSTIC PNEUMOPERITONEUM

ARTIFICIAL pneumoperitoneum for diagnostic purposes has not found great favour in this country, even though earlier experience with therapeutic pneumoperitoneum had proved that this outlined the liver and spleen clearly on radiographs. Possibly the risk of air-embolism during the induction has been the most important deterrent.

Lumsden and Truelove[7] have reported their experiences with diagnostic pneumoperitoneum using carbon dioxide as the contrast medium instead of air—thus reviving the method used by Alvarez in 1921.[8] They claim that, because carbon dioxide diffuses and is absorbed more

1. Obtainable from H.M. Stationery Office. Vol. I. Pp. xli, 393. 35*s*. the set of two volumes (vol. II to be published later).
2. See *Lancet*, 1949, i, 743.
3. Mohr, W., Berka, W., Knittgen, H., Ohr, A. *Med. Mschr.* 1951, **5**, 676.
4. Lavier, G., Deschiens, R. *Bull. Soc. Path. exot.* 1956, **49**, 541.
5. Coudert, J., Triozon, F. *Pr. méd.* 1957, **65**, 1586.
6. Janeskó, A., Urbanek, L. *Allat. Lapok.* 1931, **54**, 247.
7. Lumsden, K., Truelove, S. C. *Brit. J. Radiol.* 1957, **30**, 516.
8. Alvarez, W. C. *Amer. J. Roentgenol.* 1921, **8**, 71.

readily than air, accidental gas-embolism is far less likely; and they state that quantities of the order of 1000 c.cm. are absorbed from the peritoneum in thirty or forty minutes. The induction gives rise to little discomfort, and they have applied the method to outpatients without premedication. By displacing the gas into the upper or lower parts of the peritoneal cavity the outline of different organs is recorded on films suitably exposed. Their experience has shown that this method is of greatest value in detecting hepatic cirrhosis, hepatic metastases, splenic enlargement, fundal abnormalities of the stomach, peritoneal metastases, and peritoneal adhesions to the anterior abdominal wall. Their experience in the diagnosis of pelvic abnormality by this method has been limited.

As with all methods of non-surgical peritoneal exploration, the crucial test is whether this one provides adequate information to justify surgical exploration or to prevent unnecessary operation. It would seem that the most profitable applications of this method are likely to be in the diagnosis of upper abdominal abnormalities and of diseases of the pelvic organs in women—gynæcography as described by Granjon.[9]

PUBLIC HEALTH: A TIME OF CHANGE

CHANGES in our way of life necessitate changes in public-health work: this was the theme of Dr. H. D. Chalke's presidential address last week to the Society of Medical Officers of Health.[10] Among modern developments he named, on the one hand, better education, full employment, and a free medical service, and on the other, speed, unrest, and tension, which he called "a collective neurosis". Though Lytton wrote a hundred years ago about the stress of life and its effects, these are now intensified. Some strains on social well-being are caused by the housing shortage: thus a quarter of a million caravans are now in use—many of them as homes for people who cannot get a house or flat. Immigrants bring with them tuberculous infection and other hazards.

Public-health physicians must, he said, move with the times and react quickly to changes or even anticipate them. New situations bring new opportunities. In tuberculosis, for instance, free infection has given place to localised outbreaks which may be quickly encircled and eliminated. Some clinics will change or be lost, and the health visitor will tend to become an all-purpose social worker. New approaches to the care of the disabled and to preventive psychiatry are examples of the widening of public-health practice. The common ground between public health and kindred sciences is now generally recognised; but complete integration will have to wait for a differently constituted health service and reformed medical training. The humanities, including social and economic history, should become part of the medical curriculum.

Unlike curative medicine, said Dr. Chalke, public health needs vigorous salesmanship. Any medicosocial service will fail without the cooperation of the public. Not long ago 28% of Londoners questioned about tuberculosis said that it was not infectious. Public-opinion polls can give useful information, and medical students would probably do such work well and derive benefit from it. Health education might well make more use of the daily press. Children and young people should be the chief targets.

Medical officers of health, in Dr. Chalke's opinion, should be given the status of consultants in public health; civilians who practise public health are a little envious of their Service colleagues who rank as specialists. The Society of Medical Officers of Health is due for a change in name, for it is now an academic body rather than an association of local-government doctors. Meanwhile it should broaden its activities. The mental-health group, the teaching group, and the Service members will help in this broadening, and will encourage cooperation with doctors in other specialties.

9. Granjon, A. *Pr. méd.* 1953, **61**, 1764.
10. This will be published in the November issue of *Public Health*. An abridged version appears in the *Medical Officer* of Oct. 25.

NOBEL PRIZEMAN

THE award of the Nobel prize for medicine to Prof. Daniel Bovet will give pleasure to all who are interested in pharmacology and experimental therapeutics.

Qualifying in Geneva, Bovet worked at the Pasteur Institute in Paris from 1936 to 1948, and since then has directed the pharmacological department of the Institute of Health in Rome. His first notable work was in chemotherapy, when with Trefouel, Mme. Trefouel, and Nitti he showed that the sulphanilamide was the active part of the molecule of 'Prontosil' (introduced by Domagk in 1935)[1]. They found that, in mice, sulphanilamide itself was just as active as the complex prontosil, and this observation led to production of modified sulphonamides with a greater range of activity, the first of which was sulphapyridine.

The discovery of the really potent anti-histamines was mainly due to Bovet and his colleagues at the Pasteur.

They had been developing anti-adrenaline substances, and noticed that some of these acted also against histamine. The more active drugs produced later were mostly modifications of thymoxydiethylamine, which they described in 1937.[2] Afterwards they prepared 'Neoantigen,'[3] now known as mepyramine.

He then turned his attention to curare-like drugs, and synthesised a number of substances related to *d*-tubocurarine but of simpler structure. This then led to the production of 'Flaxedil' (gallamine); and later the neuromuscular blocking action of succinylcholine was described independently by Castillo and De Bere in 1950 and by Bovet and his colleagues in 1951. A few years earlier his interest in drugs for the relief of parkinsonian ataxia had resulted in the discovery of 'Diparkol,' reported with Sigwald and Domant in 1947, and he developed a simple test for these drugs by antagonising the effect of nicotine injected into rabbits.[4]

In addition he has found drugs to prevent ventricular fibrillation of the heart, and he is now working on the effect of substances on the central nervous system, and in particular on the reticular apparatus. In 1948, with his wife, Mme. Bovet-Nitti, he wrote a comprehensive book on substances acting on the autonomic nervous system.

Thus Bovet has produced a surprising number of drugs of use in therapeutics. He has always sought to simplify his pharmacological methods, and his success in so many different fields is partly due to a simplicity of mind which enables him to test a great number of substances in a short time. With all these achievements he retains a modesty which is associated with a ready welcome for new ideas.

Dr. GERTY THERESA CORI, who was known throughout the world for her studies on glucose metabolism, died in St. Louis, Missouri, on Oct. 26. In 1947 she and her husband, Prof. Carl F. Cori, shared with Prof. Bernardo Houssay the Nobel prize for medicine and physiology.

The next session of the General Medical Council will open on Tuesday, Nov. 26, at 2.15 P.M., when Sir DAVID CAMPBELL, the president, will deliver an address. The Medical Disciplinary Committee will sit on Wednesday, Nov. 27, at 11 A.M.

1. Trefouel, J., Trefouel, Mme, Nitti, F., Bovet, D. *C.R. Soc. Biol., Paris*, 1935, **120**, 756.
2. Bovet, D., Staub, A. M. *ibid.* 1937, **124**, 547.
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Special Articles

FAMILY CARE SYSTEMS IN NORWAY AND HOLLAND

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INTEREST in medical rehabilitation has been reviving recently, and nowhere more than in psychiatry. The social structure of our mental hospitals is being modified, hospital workshops are being set up, there are day and night hospitals, aftercare systems, sheltered workshops in the community, extensive domiciliary and outpatient services, hostels, and industrial rehabilitation units. These methods have in common the realisation that a patient's social environment is often more important in its effect on his illness than any other factor once the acute stage is passed. Another method, which has not received so much attention in this country, is family care. The Royal Commission's emphasis on the part that local authorities should play in the rehabilitation and community care of psychiatric patients may now stimulate them to take more interest in its possibilities.

In a family care system, patients live in private homes, not their own, under general psychiatric supervision. The system is claimed to be economic, because hospital bed space is released, the cost per patient may be less, and the patient may be able to do valuable productive work; humanitarian, because of increased privacy, freedom, dignity, and responsibility; social, in that the gulf between society and the patient is more easily bridged; therapeutic, since there may be good opportunities for treatment, rehabilitation, and eventual discharge.

Defectives and chronic schizophrenics who are not aggressive, suicidal or too bizarre in behaviour, and either have no homes or unsuitable homes, have been thought to be the most suitable patients for family care. However, it has also been found suitable for neurotic patients (Muncie 1945).

Family care has never been a feature of English psychiatry except in the form of guardianship. At present 3000 mental defectives are in community care under guardianship, many of them in foster families. This system is acknowledged to work well. There is also provision under section 57 of the Lunacy Act for boarding-out patients under certificate, but this section does not apply to voluntary patients. Only 50–60 patients are boarded out under it, and it is clear that neither local authorities nor hospital management committees are in favour of using it.

Family care was first introduced at Gheel, the famous colony in Brabant where it has been practised since the 7th century. There a small mental hospital with 175 beds serves as a centre for more than 2500 patients who live in the surrounding district. In other European countries there has been fluctuating and, at times, keen interest, particularly in Germany, where family care methods were greatly influenced by Griesinger and Wahrendorff, and have been mainly practised by mental hospitals. There is a more diffuse organisation in Scotland, based on the Board of Control and local authorities, which developed out of the Poor Law Act of 1845, when paupers became chargeable to the parish and those who were insane had to be lodged in an asylum or legally authorised establishment. Little accommodation was available in the existing institutions, and private houses were licensed. Without adequate supervision this led to scandalous practices, but for the past 50 years the system has worked satisfactorily. It deals mainly with mental defectives and its influence has not spread widely south of the Border. In the United States of America, a boarding-out system was introduced on a small scale in 1885, and though for many years it made little headway, the figures for patients placed in foster-families are now increasing yearly (Stycos 1951, Barton 1953). The care is organised mainly round existing mental hospitals.

During a tour of Scandinavia and Holland, I lately visited several family-care centres, which show the various approaches and advantages and disadvantages of the method.

Norway

The number of beds available in Norwegian mental hospitals in 1953 (including considerable overcrowding) was 24 per 10,000 inhabitants. The equivalent figure for England is 35 and, since the incidence of serious mental illness is probably not remarkably different in the two countries, it is clear that the Norwegians have had to use special methods to deal with the situation. Only 51% of certified mentally ill patients are cared for in mental hospitals. 39% are in private family care under supervision from a mental hospital (3%) or by the State (36%), and 10% are looked after in nursing-homes, often privately run. Clearly, to have so many patients in family care is far from ideal. It often means that those who would benefit from hospital treatment, or who need hospital care, are denied it, particularly in areas remote from a mental hospital. These administrative difficulties are well appreciated, and it is estimated that the best distribution would be 30 beds in mental hospitals, 10 beds in nursing homes, and 10 places in family care per 10,000 inhabitants. It is thought that this private care should be supervised by the local mental hospital, since an essential for the success of the scheme is that there is free movement between the hospital and the private homes. Patients should always have the benefit of everything that can be done for them in the hospital and it must be possible to exploit, by more active rehabilitation, any improvement that occurs while in family care (Lohne Knudsen 1956).

The best-organised centre in Norway is at Lier, a mental hospital for two counties with a population of 300,000. It has about 750 inpatients (with the usual overcrowding) and there are also about 300 patients boarded out from the hospital. These remain on the hospital books and can move to and from the hospital without special documents. Most are "certified" patients, but certification is not a legal process in Norway. Most of the caretakers are crofters or craftsmen, and usually there are 2–3 patients in each home. The crofters are encouraged to look on the patients as members of the family and to occupy them, where possible, like members of the household. They are paid £100–150 yearly for each patient according to the amount of work the patient can do. There is no advertisement, and families who volunteer to take patients are accepted only after careful investigation by the hospital. A senior nurse from the hospital is constantly occupied in visiting the families and each patient is seen at least once a month by a senior doctor. There is no hesitation about taking a patient into hospital at once if he needs treatment or supervision of any kind.

In the Lier valley many other patients are boarded out (supervised by local health authorities under a State system), and out of a total population of 14,000 people, about 1000 are psychotic or defective. There is a long tradition over several generations and it is very rare for anyone to make a complaint about a patient. The crime-rate among the patients is much lower than among the general population and no-one seems to think that there is any bad effect on children. When mentally ill patients are boarded out in a new district there are immediate protests in the Press and elsewhere, but after a few months it all settles down and the patients are accepted.

Dr. Ottar Lingjaerde, the medical superintendent of Lier Hospital, considers that family care is specially suitable for mental defectives, chronic schizophrenics, and a few epileptics who are clean in habit and do not need

supervision in hospital, but who cannot live on their own or with their own families. He thinks it ideal if they can work, in a family setting, as ordinary members of the community, and in this area there is always plenty of farm work. In the areas near the hospital there is probably no exploitation, though this is clearly a danger without adequate supervision.

My general impression is that the system in Norway is under too great pressure to work ideally. Family care often has to be used as a substitute for hospital care because there are no hospital beds. There cannot be a careful selection of cases, and if a patient does improve while in family care he is not always offered further active measures of rehabilitation to make him a full citizen again. Most patients in family care come under the State system which has nothing like the thorough organisation that exists at Lier, and some stringent criticisms have been made of it. In fact, family care cannot be used, as it should be, as one of a wide range of social measures and as part of a planned individual treatment. Its development as a form of treatment for convalescent psychotics, or for neurotics, has hardly begun. Even so, many chronic psychotic or defective patients are living in conditions which no mental hospital can hope to emulate, and there is much that English psychiatrists can learn from the Norwegian system.

Holland

Holland has much the same shortage of hospital beds as Norway, and most English psychiatrists are familiar with the way in which the city of Amsterdam has tackled this problem. Many hospitals have some provision for family care. Before 1922, however, there was no colony system and suitable patients were often sent to Gheel. A specially convened committee recommended that a family-care centre should be organised at Beilen, in Drenthe province. Beilen was chosen, the committee said, because of the " Saxon " qualities of the population —easy-going, tolerant, and religious (Protestant), and because the economic level was fairly low and most people were primarily food-producers.

As an experiment, in 1922, 8 women patients were placed in different families. Few difficulties were met and more were gradually placed. By 1926, 70 patients were in family care and a centre was built. There are now 370 patients, about a third of them defectives. They are sent by the social psychiatric services from all over Holland, but mainly from the three northern provinces. No acute cases are accepted, and so far as possible, patients are chosen who do not need close, everyday supervision. However, the doctors at Beilen do not themselves make the selection.

The patients are served by a centre which can take 100 inpatients in an emergency—ideally there are 80 beds. All kinds of treatment are available, but most attention is given to occupational therapy. Most of the patients work each day from 10 A.M. to noon, and from 2 P.M. to 5 P.M. in the centre. There is a market garden, pigs, chickens, facilities for haymaking, bookbinding, matmaking (there is a much larger demand than the patients can supply), carpentry, pegmaking, dressmaking, linen and laundry work, and more conventional occupational therapy. The patients are paid only pocket-money for their work, which is mostly of use to the community itself. Most of the patients do not work for the foster-families because it is feared they may be exploited. A few do so with special permission.

There is a staff of three doctors and about 75 attendants (fully qualified nurses are hard to come by). Times are set aside each day when the foster families may consult the doctor or nurse about any problem connected with family care. None of the families lives more than a mile from the centre, so that supervision can be close and constant. A senior nurse visits each home at least once in three weeks, and a doctor at least once in three months.

A patient when he is first admitted stays under observation in the centre for a varying period, both to determine whether he is suitable for family care and to select a family suitable for him. There are now more than enough applications from families and considerable selection is possible. There is a good community spirit in the town, with various social clubs to which the patients can belong. Most families are Protestant, but there is a larger proportion of Catholics among the patients. No Catholic families offer to take patients. Each family is encouraged to treat the patient as a family member. High standards are laid down for care and accommodation. No family may have more than three patients, and each must have his own room. Clothes, bedding, and furniture are provided by the centre. Payment is about 5*s*. 6*d*. daily.

Over the years, there has been some change in the kind of patient which families will accept. Patients are now expected not to look too odd, and people prefer those who dress and behave conventionally. The social pretensions of the community have grown as its economic status improved, and the local people themselves now pay more attention to clothes and manners and therefore ask more of the patients. More psychopathic and neurotic patients are taken than when the centre first opened, and the doctors are more confident about the sort of family they can ask to take a chronic neurotic patient. Such family care can be combined with central psychotherapy, though this has not been attempted on a large scale. The easiest to place are the defectives; the most difficult, alcoholic addicts. There is no difference according to sex, though it is somewhat more difficult to keep a woman patient in a family than a man.

In the past four years there have been three unwanted pregnancies. The sexes are allowed to mix under supervision only, but the main problem is in protecting young defective girls. The families take a great deal of responsibility for the patients in their care—seeing that they eat properly, keep themselves clean, are respectably clothed, and so on. They are not only interested in the profit they can make, but often take a personal interest, comparable to that of a psychiatric nurse.

Discussion

Three different family care systems have been described. Beilen is a family care colony; at Lier the mental hospital is the centre of the system; in most of the rest of Norway there is a more diffuse system based on the public-health organisation.

I visited several of the families at Lier and at Beilen and there seems no doubt from what I saw that both these systems can work well. Chronic psychotic patients can be cared for with decency and humanity, their individuality respected, their idiosyncrasies tolerated, and their freedom of movement and personal liberty encouraged as far as it can be. It may also be possible for them to do a full day's productive work. Moreover, the incentive for the people who look after the patient is not necessarily only financial, though this may lead them to take up the work in the first place. If no more than this were claimed, it would be clear that there are patients in all mental hospitals who ought to be in family care.

The three systems described have, in the main, been treating patients for whom there seemed little hope of recovery, and eventual full return to the community is not necessarily the criterion for success. Something of the custodial, rather than the therapeutic, attitude has coloured their organisation (Carstairs, Clark, and O'Connor 1955). At Beilen the work provided is nore realistic than the usual occupational therapy, but the patient is not regarded as a person who may be able to support himself by his work, paying part of his wage to the centre, and thus maintaining his independence. Even in Norway,

where some patients work as hard as any other member of the community, there is no payment apart from pocket-money. Furthermore, the system is rarely used as a short-term measure, to help a convalescent patient towards his discharge to an independent life in the community.

It would seem possible to organise a centre where various kinds of industrial work were done. Thomée (1954) in Malmö, Sweden, has started something in a small way on these lines. He has a workshop in which small components for calculating machines are inspected and assembled. His patients, whose diagnoses range from chronic schizophrenia to inadequate psychopathy, live in a hostel in the town, or in their own families. The workshop organised at Banstead Hospital by the M.R.C. Social Psychiatry Research Unit and the hospital staff (Baker 1956, Carstairs, O'Connor, and Rawnsley 1956) has shown that work of this kind can be done within the hospital by patients many of whom might once have been regarded as hopeless cases. Patients in community care, in hostels, family care, or their own homes might attend a centre daily, earning the rate for their job and contributing towards their own upkeep. Such a centre would go far to meet the objection that family-care systems can only be set up in rural communities. Many hospitals are finding that thanks to their methods of rehabilitation and of prevention of institutionalisation, many patients hardly need to stay in hospital yet cannot be discharged home. They need a halfway house.

The cost of a centre of the Beilen type would probably be little different from the cost of inpatient treatment at a mental hospital. The care at Lier, organised round a mental hospital, would cost rather less than inpatient care.

It is difficult to assess the results of this sort of care, which can be justified even when the span of care is not shortened. Of the 320 patients boarded out at Beilen in 1954, 17 were discharged "socially cured." But in any discussion of family care it is important to remember how many other methods of social rehabilitation there now are—day and night hospitals, domiciliary visiting, sheltered workshops, hostels, clinics, and centres. Each has its indications and none can be completely separated from inpatient units, which nowadays are less and less isolated from the rest of the community. The psychiatrist has to decide which method, or combination of methods, is best for each patient. Used in this way, after social and somatic treatment within a mental hospital, and with the support of the other social services, there seems no reason to doubt that family care could contribute considerably towards the rehabilitation of many kinds of psychiatric patients.

I would like to express my appreciation of the hospitality and cooperation given me by the staffs of every centre visited, and in particular to thank Dr. Ottar Lingjaerde of Lier, Dr. Lohne Knudsen of Oslo, and Dr. R. Zijlstra and Dr. Muller of Beilen for their help. My thanks are also due to the board of governors of the Maudsley Hospital for a grant which made the tour possible.

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Public Health

INFECTION OF VOLUNTEERS WITH ASIAN INFLUENZA VIRUS

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DURING the past few months an epidemic of influenza caused by the so-called Asian variety of influenza virus A has spread throughout the world. Fortunately the epidemic has remained mild everywhere, but at the back of some people's minds has been the question—what preventive measures could be taken if the virus were suddenly to increase its virulence? It would not be possible to prepare sufficient inactivated virus vaccine in time to immunise more than a small fraction of the people who would need it. With this question in mind Zhdanov et al.[1] report the results of an interesting experiment in which they administered as nasal drops *large* doses of Asian influenza virus passed four to six times in eggs. 4 out of 30 volunteers had pyrexia and the remainder who had none "did not feel seriously ill." Virus was recovered from nasal washings taken up to four days after inoculation and antihæmagglutinin against the virus appeared in the serum of all volunteers. Zhdanov et al. conclude that this procedure would be a practicable method of immunisation in a pandemic and that the inoculum was acting as a live virus vaccine. However, they had to give each volunteer roughly the same amount of egg fluid as is needed to produce a dose of inactivated virus vaccine; moreover the symptoms, the antibody response, and persistence of virus in the throat may have been due to the large dose of virus antigen administered rather than to the progressive multiplication of virus generally implied by the phrase "live virus vaccine."

With the same questions in mind we have recently been testing the effect of small doses of live Asian influenza virus given to volunteers by the intranasal and pharyngeal routes. Although only 12 volunteers took part the results are reported now because of their topical interest.

1. Zhdanov, V. M., Ritova, V. V., Orlova, A. V., Sokolova, N. N., Golygina, L. A. *Lancet*, Oct. 12, 1957, p. 735.

METHODS

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Only a small number of volunteers have been infected, and at the moment it has been necessary to postpone further experiments since the results might be difficult to interpret in the presence of an influenza epidemic. With the proviso that further trials are required to confirm these findings, two conclusions may be drawn from these experiments. The first is, in confirmation of earlier work (Isaacs and Roden [2]), that after passage in the chick embryo influenza-A viruses rapidly lose the ability to multiply in man as tested by administration of small doses of virus in this way. It would seem that future trials of this kind might be better carried out with virus grown in tissue-culture. The second conclusion is that in the event of a sudden increase in virulence of the Asian virus it might be possible to prepare by one amniotic and one allantoic passage sufficient virus from known Asian virus strains to give large numbers of people a mild infection which might protect them against a more serious infection.

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The Ministry of Agriculture, Fisheries, and Food, announces that when cows have been removed from the restricted area to fresh pastures, their milk can be used after twenty-four hours. Foodstuffs and water (except milk and milk products) from the restricted area are perfectly safe, and there is no danger of sterility in farm animals from the area. On Thursday, restrictions were lifted from a zone of 80 square miles in the south-eastern perimeter of the affected district; milk from the derestricted zone is now regarded as being entirely safe for human consumption.

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Home Safety Week

Every year in England and Wales there are about a million home accidents warranting hospital treatment—at a cost of about £4 million for inpatient care alone, and a formidable amount of suffering. In the county of London, on average, every day one person dies of a fall, poisoning, or burns, sustained at home. Last year the London County Council conducted a campaign pointing to the dangers, and in the very next week the number of people conveyed to hospital by the Council's ambulances after a home accident fell noticeably. The campaign is to be repeated next week by means of leaflets, posters, advertisements, talks, and films. A three-week exhibition at Charing Cross Underground Station was opened by Mr. Herbert Morrison on Oct. 28. The exhibition is open from 10 A.M. to 7 P.M. on weekdays, and admission is free.

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In the third quarter of this year,[1] 179,925 live births were registered—i.e., 15·9 per 1000 population, the highest rate for the quarter since 1949. 110,070 deaths were registered, a rate of 9·7 per 1000—the highest for the quarter since 1944. The infant-mortality rate was 21·4 per 1000 live births, compared with 20·1 in 1956 and 21·6 in 1955. The stillbirth-rate was 22·3 per 1000 live and still births.

Swedish Statistics

THE Swedes are a homogeneous population of some 7 million people, little affected by immigration, and with a high standard of living, undisturbed by war since 1814. Professor Ask-Upmark has written an attractive booklet[2] in English to highlight some interesting facts about his countrymen. As in Britain, the increasing expectation of life in Sweden is leading to an ageing population, with a falling birth-rate. 10% of births are illegitimate, but what seems more surprising is that 54% of the legitimate births occur in girls aged 15-19, barely on the threshold of womanhood.

Half the deaths in Sweden are due to cardiovascular diseases. Cancer is the next main cause. Violence takes third place, with a disturbingly high suicide-rate in men. Professor Ask-Upmark notes that most suicides take place in May, when the long winter ends. Respiratory diseases, mainly pneumonia in the elderly, are the fourth main cause of death.

Although deaths from pulmonary tuberculosis have declined, the disease remains a major cause of disability, and asthma also seems very troublesome on the coasts. The high incidence of rheumatic fever is blamed for much cardiovascular disease. But Professor Ask-Upmark gives some much more surprising data: chronic alcoholism is very prevalent in Sweden, and contributes to the high accident- and suicide-rates. 25% of men have been convicted at least once in court for drunkenness, and 10% have been under temperance-board care in Stockholm.

These are not the only startling figures: 20% of the Swedish population suffer from peptic ulcers at some time in their lives; and 20% of all types of hospital beds are occupied by schizophrenic patients.

Professor Ask-Upmark attributes some of these phenomena to political fears engendered by Sweden's geographical position, and others to the crime wave, monetary inflation, and taxes. But he sums up by saying that Sweden still remains a fairly happy country in which to live and work.

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2. Life, Death and Disease in Sweden. By ERIC ASK-UPMARK, M.D., professor of medicine, Royal University of Uppsala, Sweden. Stockholm: Almqvist & Wiksell, 1957. Pp. 56. Swedish Kr. 4.75.

where some patients work as hard as any other member of the community, there is no payment apart from pocket-money. Furthermore, the system is rarely used as a short-term measure, to help a convalescent patient towards his discharge to an independent life in the community.

It would seem possible to organise a centre where various kinds of industrial work were done. Thomée (1954) in Malmö, Sweden, has started something in a small way on these lines. He has a workshop in which small components for calculating machines are inspected and assembled. His patients, whose diagnoses range from chronic schizophrenia to inadequate psychopathy, live in a hostel in the town, or in their own families. The workshop organised at Banstead Hospital by the M.R.C. Social Psychiatry Research Unit and the hospital staff (Baker 1956, Carstairs, O'Connor, and Rawnsley 1956) has shown that work of this kind can be done within the hospital by patients many of whom might once have been regarded as hopeless cases. Patients in community care, in hostels, family care, or their own homes might attend a centre daily, earning the rate for their job and contributing towards their own upkeep. Such a centre would go far to meet the objection that family-care systems can only be set up in rural communities. Many hospitals are finding that thanks to their methods of rehabilitation and of prevention of institutionalisation, many patients hardly need to stay in hospital yet cannot be discharged home. They need a halfway house.

The cost of a centre of the Beilen type would probably be little different from the cost of inpatient treatment at a mental hospital. The care at Lier, organised round a mental hospital, would cost rather less than inpatient care.

It is difficult to assess the results of this sort of care, which can be justified even when the span of care is not shortened. Of the 320 patients boarded out at Beilen in 1954, 17 were discharged "socially cured." But in any discussion of family care it is important to remember how many other methods of social rehabilitation there now are—day and night hospitals, domiciliary visiting, sheltered workshops, hostels, clinics, and centres. Each has its indications and none can be completely separated from inpatient units, which nowadays are less and less isolated from the rest of the community. The psychiatrist has to decide which method, or combination of methods, is best for each patient. Used in this way, after social and somatic treatment within a mental hospital, and with the support of the other social services, there seems no reason to doubt that family care could contribute considerably towards the rehabilitation of many kinds of psychiatric patients.

I would like to express my appreciation of the hospitality and cooperation given me by the staffs of every centre visited, and in particular to thank Dr. Ottar Lingjaerde of Lier, Dr. Lohne Knudsen of Oslo, and Dr. R. Zijlstra and Dr. Muller of Beilen for their help. My thanks are also due to the board of governors of the Maudsley Hospital for a grant which made the tour possible.

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Public Health

INFECTION OF VOLUNTEERS WITH ASIAN INFLUENZA VIRUS

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DURING the past few months an epidemic of influenza caused by the so-called Asian variety of influenza virus A has spread throughout the world. Fortunately the epidemic has remained mild everywhere, but at the back of some people's minds has been the question—what preventive measures could be taken if the virus were suddenly to increase its virulence? It would not be possible to prepare sufficient inactivated virus vaccine in time to immunise more than a small fraction of the people who would need it. With this question in mind Zhdanov et al.[1] report the results of an interesting experiment in which they administered as nasal drops *large* doses of Asian influenza virus passed four to six times in eggs. 4 out of 30 volunteers had pyrexia and the remainder who had none "did not feel seriously ill." Virus was recovered from nasal washings taken up to four days after inoculation and antihæmagglutinin against the virus appeared in the serum of all volunteers. Zhdanov et al. conclude that this procedure would be a practicable method of immunisation in a pandemic and that the inoculum was acting as a live virus vaccine. However, they had to give each volunteer roughly the same amount of egg fluid as is needed to produce a dose of inactivated virus vaccine; moreover the symptoms, the antibody response, and persistence of virus in the throat may have been due to the large dose of virus antigen administered rather than to the progressive multiplication of virus generally implied by the phrase "live virus vaccine."

With the same questions in mind we have recently been testing the effect of small doses of live Asian influenza virus given to volunteers by the intranasal and pharyngeal routes. Although only 12 volunteers took part the results are reported now because of their topical interest.

METHODS

These experiments are a continuation of those reported by Isaacs and Roden[2] and the methods used were the same with only a few modifications. The virus used was the A/Nederland/37/57 strain isolated in fertile hens' eggs by Prof. J. Mulder in Holland. In the first trial it was used after one amniotic and one allantoic passage; in the second trial this virus was given two further passages at high dilution by the allantoic route. Volunteers recruited especially for influenza trials were kept in isolation at the Common Cold Research Unit, Harvard Hospital, Salisbury, and were examined twice daily by one of us who remained in isolation with the volunteers throughout the trials. None of the volunteers had any detectable antihæmagglutinin to Asian viruses before inoculation. The allantoic fluid was diluted 1/1000 and 1 ml. instilled intranasally, while a swab full of material diluted 1/100 was applied to the throat; this represented roughly 1000 E.I.D.$_{50}$ of virus given to each volunteer.

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Symposia

ANTIBIOTICS

THE 5th annual symposium on Antibiotics, sponsored by the United States Food and Drug Administration's division of antibiotics, in collaboration with the journals *Antibiotics and Chemotherapy* and *Antibiotic Medicine and Clinical Therapy*, was held in Washington, D.C., on Oct. 2–4. Dr. HENRY WELCH was chairman. The crowded programme was attended by over 800 doctors and included 120 papers and 3 panel discussions. We publish here a summary of some of the findings and views set out at the symposium.

Misuse of Antibiotics

In the first Randall lecture (in commemoration of Dr. W. A. Randall, of the U.S. Food and Drug Administration) Dr. E. JAWETZ (San Francisco) emphasised the widespread use and misuse of antibiotics. Of 743 people in a small town in North Dakota only 60 had not received some antibiotics during a five-year period; the administration of antibiotics had been unnecessary in at least half the cases. Dr. Jawetz chided the advertisers of antibiotics for their propaganda directed against the medical profession, and he strongly urged restraint in the use of antibiotics so as to combat the development of bacterial resistance.

Resistance to Antibiotics

The problem of resistance to antibiotics is still largely confined to staphylococcal and urinary infections in hospitals, although there is also some suggestion of a lowered sensitivity of the gonococcus to penicillin. Antibiotic-resistant staphylococci are certainly being fostered and spread within closed hospital communities, but the evidence still is that no such event is occurring in the population at large as a result either of the dilution of hospital cases or the widespread use of antibiotics by general practitioners. In 200 members of the public receiving poliomyelitis prophylaxis in Indianapolis, 101 *Staphylococcus aureus*, 190 *Staph. albus*, and 2 *Staph. citreus* strains of so-called "street staphylococci" were obtained. Of these 70% were sensitive to penicillin, 100% to erythromycin and chloramphenicol, and 97–99% to novobiocin, tetracycline, and aureomycin.

Nevertheless there was some support for the following principles, which are applied in a number of hospitals to reduce the bacterial resistance: (1) rigid asepsis and the avoidance where possible of catheterisation; (2) restraint in the use of antibiotics and the avoidance of prophylactic antibiotics except on well-established indications; (3) the complete restriction of one antibiotic to use in serious cases (e.g., staphylococcal septicæmia) due to organisms resistant to other antibiotics.

Reactions to Penicillin

Dr. WELCH reported the results of a new survey in the United States into the incidence of penicillin sensitivity for the period 1953 (when an earlier survey was made) to 1956. The survey covered 827 of the 5431 general hospitals in the U.S.A. 3419 case-histories of reactions to antibiotics were evaluated, of which 422 were discarded. Of these, 1072 reactions were classified as life-threatening, which included 809 of anaphylactoid shock, 107 superinfections, 70 severe skin reactions, 46 blood dyscrasias, and 38 of angioneurotic œdema with cerebral or respiratory involvement. A total of 1925 others were classified as non-life-threatening cases. Of the 809 anaphylactic cases, 793 followed penicillin and there were 72 deaths: 611 (with 63 deaths) followed intramuscular injection. There were no deaths from oral preparations. There were only 16 cases due to other antibiotics with 2 deaths (both from streptomycin). Of the 107 superinfections with 40 deaths, most were due to preparations other than penicillin, 90% of which were given orally (74 staphylococcal enteritis, 25 enterocolitis, and 8 moniliasis). Of the 70 severe skin reactions penicillin was responsible for 47 (dermatitis 33, purpura 11, and erythema multiforme 3) with 5 deaths.

Of the 46 cases of blood dyscrasias (27 deaths) chloramphenicol had been used alone in 16 (11 deaths), and in combination with other drugs in 25 cases (14 deaths). This type of complication was more common in white females under the age of 12 with a history of chronic illness, and it was rare in coloured persons. Of 38 cases with angioneurotic œdema with 5 deaths, 37 (4 deaths) followed the use of penicillin and included 1 fatality from oral penicillin—the only one.

Serious though these reactions were it must be remembered that in the years 1954–56 some 900 tons of penicillin was produced in the U.S.A. (or 400 tons if human medicine alone is considered)—enough for 2 billion doses each of 300,000 units.

A promising advance in the management of penicillin sensitivity reactions has been reported. Penicillinase, the enzyme that hydrolyses and inactivates penicillin, can neutralise pencillin in the body. Single injections of 5000 units of penicillinase will inactivate 100,000 units of crystalline penicillin G given simultaneously and repeated after 8 hours. The inactivating activity apparently persists for as long as four days. The penicillinase is non-toxic and no hypersensitivity to it has been demonstrated in animals. In patients wth demonstrable levels of circulating penicillin the blood has been cleared of the antibiotic in fifteen to sixty minutes. Penicillinase was used successfully in two series each of about 50 patients with long-continued penicillin sensitivity. Its use in anaphylaxis has not so far been described, but one worker suggested that, like adrenaline, penicillinase should be on hand wherever penicillin is used.

Tetracyclines

The tetracycline phosphate complex has given promising results intramuscularly and was "quite well tolerated." Blood-levels in children can be sustained for as long as twenty-four hours after single doses of 25 mg. per kg. In adults levels of 1·1 μg. per ml. were obtained for twenty-four hours after doses of 500 mg. Single injections have proved no more painful than injections of saline, but multiple injections of 500 mg. are too painful to be given for long. The sodium metaphosphate tetracycline was reported to give higher initial serum levels than the hydrochloride when given orally and has proved as good as tetracycline hydrochloride in urinary infections: the incidence of gastrointestinal side-effects is the same with both.

The growth-promoting effects of the tetracyclines have been tested in man. In Haiti from October, 1956, until the present time 243 schoolchildren have been given 50 mg. of oxytetracycline daily. The growth response was considerably better than in matched controls. There were no toxic reactions, moniliasis, or evidence of dermal sensitivity, and no tetracycline-resistant strains emerged. In a New York study in infants, in which the same dosage was employed over a period of six months, there was a slightly increased gain in weight and height in the treated group. A greater effect would be expected in communities where dietary standards were relatively low.

Influenza was sweeping the Washington schools at the time of the symposium, and Dr. A. FLORENTIN described the epidemic in the Philippines. Recovery had apparently been quicker, and the incidence of complications lower, when the tetracycline antibiotics were used than when aspirin alone was given.

Chloramphenicol

Oral administration of the monosuccinate ester of chloramphenicol had resulted in some absorption, but absorption was poor with the disuccinate ester. Chloramphenicol acid succinate (sodium salt) could be given intravenously or intramuscularly and had been well tolerated in children. It was recommended when parenteral chloramphenicol was indicated.

Erythromycin

Folic acid was used in a blind study with and without erythromycin and apparently prevented antibiotic diarrhœa, or controlled it when it arose. In rheumatic-fever prophylaxis no protection against streptococcal or rheumatic infections was noted with erythromycin, and erythromycin-resistant staphylococci were isolated from the throats of most of those tested. Penicillin, on the other hand, proved definitely useful, and benzathine penicillin by injection gave the best results.

Novobiocin

Novobiocin had apparently proved very successful in the treatment of staphylococcal puerperal mastitis. The antibiotic appeared in the milk in about a quarter of the serum concentration. It had also been successful in Spain against

Malta fever, and elsewhere in staphylococcal septicæmia. As with other antibiotics resistant strains of staphylococci may emerge.

In-vitro tests showed that *Nocardia asteroides* is sensitive to novobiocin. Trials in scarlet fever, however, indicated that it was inadequate in that disease and that better results were obtained with tetracycline.

Oleandomycin

Oleandomycin is well tolerated whether given orally or systemically. Various crystalline variants of oleandomycin have been prepared and higher blood-levels were claimed with PA 777, a new ester of oleandomycin. The antibiotic did not diffuse into the cerebrospinal fluid in normal subjects but it did so in diseases of the nervous system, when its level was said to be enhanced by the addition of tetracycline.

Synergism between oleandomycin and tetracycline has been claimed for some strains of bacteria; but other workers believed that the effect of the combination was only additive and that the results achieved could be obtained by one of the antibiotics alone. Of greater practical importance was the question of cross-resistance between oleandomycin and erythromycin which had been reported with some strains, especially as in some institutions it was the practice not to use erythromycin as a routine so that staphylococci resistant to other antibiotics might still be sensitive to it in an emergency. Whereas cross-resistance between erythromycin and oleandomycin had been noted in certain laboratory strains it did not follow that the same would hold for naturally occurring hospital strains. The tetracycline-oleandomycin combination was reported to give excellent results in infections caused by coagulase-positive staphylococci, and also in abortus fever, non-gonococcal urethritis (as good or better than 11 other substances tested), chronic sinusitis, chronic intestinal amœbiasis, yaws, lymphogranuloma venereum, and tropical ulcer.

New Antifungal Antibiotics

A number of the new antibiotics are fungicidal or fungistatic. Some have been combined with familiar antibiotics in an attempt to reduce complicating superinfections with moniliasis during antibiotic treatment.

Amphotericin A and B were used topically 3–4 times a day in infants with oral moniliasis. Of 20 given amphotericin B ('Fungizone') there was prompt response in 7, fairly good in 8, and no response in 5. Using a mixture of amphotericin B with sodium desoxycholate, a water-soluble form had been prepared for intravenous use. It was three times as toxic as the orally administered preparation. It had been used in a variety of systemic fungus diseases: of 6 patients with cryptococcal meningitis, previously considered a uniformly fatal illness, 5 were alive after a follow-up period of five to ten months.

Six strains of candida were exposed to increments of 'Nystatin' and amphotericin B. Resistance to one or both antibiotics developed to all but *Candida albicans*. 20 cases of oral thrush in infants were treated with daily doses of 1,600,000 units of lyophilised nystatin in aqueous suspension given orally and topically four times a day. 90% were cured after one or two courses. Ten days of treatment was required and longer if spores survived.

For bowel preparation before colonic surgery neomycin (1 g.) and nystatin (250,000 units) were given every four hours for 13 doses ending the evening before surgery. Of 31 patients treated the measure was successful in 27 and unsuccessful in 4 because of severe vomiting. 29 of the stool cultures were negative: none had fungi. In a previous series of 23 patients given neomycin without nystatin 5 had *Candida albicans*.

New Antibacterial Antibiotics

Ristocetin A and B have been isolated from the fermentation beer of *Nocardia lurida*. Both have similar properties being effective against gram-positive organisms, gram-negative diplococci, and *Mycobacterium tuberculosis*. Ristocetin B is 3–4 times more potent than ristocetin A. Given intravenously in single doses up to 50 mg. it has proved useful in cases of staphylococcal pneumonia not responding to other antibiotics. It has also been successful in 6 patients with enterococcal and 1 with staphylococcal endocarditis. 2 g. per day in two doses for two weeks was considered adequate.

A new polypeptide antibiotic named *telomycin* had been isolated from an unidentified species of actinomycete and it was active against gram-positive bacteria. Blood-levels persisted for sixteen hours after intramuscular injections of 20 mg. per kg. Toxicity tests in dogs indicated that it should be well tolerated. Another antibiotic, *sulfocidin*, isolated from a previously undescribed streptomyces, had proved active against gram-positive and gram-negative bacteria, mycobacteria, and fungi, and also against the ascitic forms of tumours in mice. A group of new antibiotic substances active against *Myco. tuberculosis* (called the quinocycline complex) had been recovered from broth filtrates of a culture strain belonging to the *Streptomyces aureofaciens* group.

Chemotherapeutic Substances

A number of antibacterial chemotherapeutic substances also received attention. *Sulphamethoxypyridazine*, a new sulphonamide for which fewer doses are required, was given to children. An initial dose of 70 mg. per kg. followed by 20 mg. per kg. twice daily was sufficient. It was rapidly absorbed and no change in the bacterial flora of the bowel was noted.

In antibiotic-resistant urinary infections methionine (12–15g. daily) caused a fall in the pH of the urine and maintained it at 4·5–6·0. Low levels of bacteriuria could be maintained for long periods and some patients might be cured bacteriologically. Another worker reported that neomycin, *nitrofuradantoin*, and chloramphenicol (in that order) were the most effective in such circumstances.

A new form of P.A.S., *phenyl P.A.S.*, had been used to prevent the emergence of antibiotic-resistant bacilli during the treatment of tuberculosis. Patients resistant to P.A.S. were also resistant to phenyl P.A.S.

Host Resistance and Chemotherapy

The discussion on host resistance largely concerned properdin, a substance which, in the presence of complement and magnesium ions, has bactericidal, virus neutralising, and hæmolytic properties. Properdin complexes may be formed from zymosan, endotoxins, dextrans, or mucins and will inactivate complement. The serum-properdin levels represented a balance between bacterial and tissue products and were low in severely ill surgical patients.

Gamma-globulin adsorbed with staphylococci no longer had a curative action in staphylococcal infections of mice. The therapeutic effect of gamma-globulin was believed to be due to the presence of specific antibodies. In testing children for gamma-globulin levels, it was not found possible to differentiate clinically children with serum-gamma-globulin levels outside the normal range.

Antibiotics were used with and without hydrocortisone in purulent meningitis. In 49 patients with meningococcal and 57 with *Hæmophilus influenzæ* meningitis the spinal fluid returned to normal more quickly when hydrocortisone was not used.

Antibiotics and Food

Duramycin, a new polypeptide antibiotic, was effective against a number of strains of pathogenic plant fungi. Dihydrostreptomycin would control infectious synovitis in chickens if given at the same time as the infectious agent. Many antibiotics were tested in vitro against numerous organisms found in cattle mastitis: a combination of oxytetracycline and polymyxin B was the most active.

Antibiotics had also been used to increase fertility in artificially inseminated cattle by means of douches containing calcium-oxytetracycline-glucose complex (equivalent to 100 mg. of oxytetracycline hydrochloride) in 5–10 ml. of distilled water, and administered vaginally within twenty-four hours of insemination.

Antibiotics continued to be used to encourage the growth of poultry. Oleandomycin improved growth when put in poultry feeds in 4–40 g. amounts per ton of feed. That the effect of such antibiotics in such circumstances was secondary to antibacterial effects seemed to be indicated by work showing that untreated germ-free chickens had similar characteristics to penicillin-treated conventional ones.

In England Now

A Running Commentary by Peripatetic Correspondents

WHY did I ask for this pathological investigation? Now that I have the result in my hand, I have no idea why I ordered it. It has, as far as I can see, no possible bearing on the case. Whatever the result, it would not influence the diagnosis or the treatment. In any case, I do not know the normal values and therefore do not know whether the results are abnormal. My book is too out of date to mention it.

Why did I ask for it? Could it be that I read an article about it? I have no recollection of doing so. Perhaps some of my friends suggested it, but I can't think how or why. Was it perhaps some new idea that flitted in and out of my brain? I had better ring up the pathologist and ask him about it. No, this test has occupied several man-hours in the lab. It might cause ill-feeling if I now ask what is its significance. In fact, I had better keep out of the way of all pathologists for the next few days in case *they* ask *me* about it.

Perhaps I ought to go to the library to find out about it. Quite apart from pathologists, the Chief may ask me why I ordered it. Yet even if I read the latest literature on the subject I still won't know why I ordered it for this patient. It would really be simpler to send the whole thing for filing before the Chief sees it at all. Wait a minute, I remember now. The Chief ordered it himself. That at least lets me out. But why did he order it? I'm sure he doesn't know. He will have no recollection of it now and won't know the normal values any more than I do. Furthermore, he will expect me to explain it to him and whatever I say will put him in a bad mood.

Yes, the wisest course is to send it for filing before he sees it. He won't remember it, the pathologists won't tackle him about it, and we will continue to treat the patient in the usual manner, as we would have done in any case.

* * *

The elegant rooms of the Royal Society in Burlington House must be accustomed to a certain amount of eccentricity, but perhaps the annual exhibition meeting of a well-known entomological society, provides them with more than usual. Each year entomologists gather from far and near—Inverness-shire, Edinburgh, Lancashire, Yorkshire, the West Country, to name a few, as well as many from London itself. Despite the diversity of physical types—and even our best friends consider us a queer lot—we are bound together by a common interest, amounting at times almost to a passion, in insects.

The last weekend in October is thus almost sacred to the entomologist, both amateur and professional, for he (and sometimes she) brings along to Burlington House the prize captures of the year. Most of these are the brightly coloured lepidoptera, but other exhibitors explore more abstruse and scientific fields and bring what are rather snobbishly dubbed the "other orders" (no reference to ecclesiastical matters is inferred from this title). Each year a subject for special effort is announced and this year we were urged to concentrate on foreign lepidoptera. It was therefore with great interest, tinged no doubt by regrets at our relatively dull and meagre fauna, that we saw the glamorous beauties from China and Formosa, India, Africa, South America, Canada, and even the mainland of Europe. Large and small, the species seem to outshine those of the British fauna.

Many orders of insects do not lend themselves to exhibition, either because they are so specialised or because they are so small that their detailed structure can be seen only with a microscope. Many Aurelians are skilled artists, and the miniaturist has great scope for the practice of his art in depicting the beauties of the butterflies and moths. At the meeting were some fine water-colour paintings of moths and butterflies, another set of illustrations of grasshoppers—a group of insects often very colourful in life but which becomes dingy and relatively uninteresting on death—and not least some exquisite and delicate stippled pen-and-ink drawings, the highlight of which was of some ivy with its blooms upon which moths were feeding.

* * *

Salmon fishing in the straits of Juan de Fuca, between the south shore of Vancouver Island and the Olympic Peninsula in the State of Washington, may have the added interest of killer whales. At one moment the vast black creatures are gambolling like porpoises in a single line ahead, stretching from east to west as far as the eye can reach. Suddenly not a whale is to be seen. After less than a minute there they are again exactly as before, but travelling from west to east. Who gives the signal and how is it communicated?

The verbal appurtenances of trolling for salmon are as snappy as so many North American phrases. After fixing a "strip-teaser" of herring like a cocktail canapé and catching your "sock-eye" or cohoe, your estimate of its weight can be corrected with a "De-liar" spring-balance. Driving into Victoria with your catch, you may stop at a "tank and tummy service" station for gas and a meal—including perhaps "Fish and Chips—Olde Englishe Style"; cross the street at an "intersection" to buy your child a hat at the "Tiny Tots Toggery" (but you may only cross diagonally at a "scramble corner" sign); and sleep at a "motel", avoiding one spoken of dubiously as tainted with the "hot pillow" trade.

* * *

While we dealt with the patients in morning surgery, our secretary was answering 30 or more calls on two incoming lines, jotting down the name and address of the next influenza victim, and the initials of the doctor liable for the job. Then while we gulped down our coffee, she presided like a judge, dishing out sentences to the assembled partners. "Finally," said she, turning to David, already with a heavy list, "there's your wife." "Heavens," he said, "she surely does not want a VISIT?" "No," said our secretary, as ever calm and efficient, "a prescription will probably do for her."

* * *

I wonder if the Russian satellite may be considered as a space-occupying lesion? It has certainly provoked a general inflammatory reaction in the world.

* * *

To my Doctor on his Birthday

(From Béranger's "Laissez nous fêter notre ami...")

Slainte now with three times three,
Doctor dear, for all we owe you:
May you, just tonight, be free
To carouse with those that know you.
In your trade the round of phones,
Callers, senders, never ends.
Take your mixture, Mrs. Jones!
He is dining with his friends.

Yes, for once, let patients wait:
He is occupied inside.
Frightened playboys storm the gate—
Venus swore, but Venus lied.
Gentlemen, I share your sorrow—
Human folly never ends.
Keep your pox until tomorrow—
He is dining with his friends.

Should a new arrival knock,
Must he spoil our celebration?
Daughter has outgrown her smock
To the brink of expectation—
Pains begin, the time is near,
Parents fume, the midwife sends:
Just hold everything, my dear—
He is dining with his friends.

May his Autumn weather hold,
Winter lag in its progression:
May he still in growing old
Never need his own profession.
With his cronies making cheer
He's alight at both his ends—
Die without him, patients dear!
He is dining with his friends.

A.C.

Letters to the Editor

BACTERIA AND INFLUENZA

SIR,—With the cooperation of many hospital pathologists, the Public Health Laboratory Service is collecting records of cases of fatal pneumonia associated with influenza-like illness. The reports received so far enable us to add a few figures to your leading article last week.

We have had complete records of 36 fatal cases. In 31 *Staphylococcus aureus* was the major or only pathogen isolated from the lung; in 2 of these cases group-A hæmolytic streptococci and in 2 others *Hæmophilus influenzæ* were also found. Of the 5 cases yielding no staphylococci, 3 gave coliform organisms, 1 a group-A and 1 a group-C streptococcus.

Of the 31 strains of staphylococci, 19 were sensitive to all the common antibiotics. 12 were resistant to penicillin, but only 4 of these were resistant to tetracyclines; only 1 of them was reported to us as showing any degree of resistance to erythromycin. 2 of the 12 penicillin-resistant staphylococci were certainly, and 1 probably, acquired in hospital; and 2 of the 4 tetracycline-resistant strains were among the hospital infections. The staphylococci belonged to a great variety of phage-types, the drug-resistant strains being mostly of the types commonly found in hospitals.

Incomplete records for another 50 cases show a similar frequency of drug-resistant strains.

M. PATRICIA JEVONS
C. E. D. TAYLOR
R. E. O. WILLIAMS.

Central Public Health Laboratory, Colindale, London, N.W.9.

INFLUENZA COMPLICATING HEART-DISEASE IN PREGNANCY

SIR,—We should like to draw attention to the serious consequences of influenza in pregnancy complicated by valvular disease of the heart. We have had experience of this condition in 9 patients, 4 of whom died.

Clinically, these patients presented with signs of an acute febrile illness, and within twelve hours of the onset there was an obviously fulminating bronchopneumonia, accompanied by a distressing unproductive cough. A peculiar "blue" cyanosis was a characteristic feature. Despite the fact that all had signs of mitral stenosis, there was little evidence of cardiac failure although tachycardia was a constant finding. The blood-pressure remained normal throughout. Signs of bronchopneumonia with tachypnœa were prominent and a considerable degree of ketosis developed. All the patients had a high temperature (102–103° F.) and examination of the blood showed a low white-cell count.

5 patients went into labour during the acute stage of the infection. (Of the 4 patients who died, 3 came into this category.) 2 babies were stillborn and 3 died within forty-eight hours.

Post-mortem examination confirmed the clinical impressions. Despite cyanosis there was little evidence of cardiac failure. Œdema was absent and there was no chronic venous congestion of the organs. The heart showed mitral stenosis, but there was an absence of the fresh vegetations usually associated with fatal cardiac failure in pregnancy.

A widespread bronchopneumonic consolidation was present in both lungs, and the cut surface showed irregular areas of hæmorrhage through the parenchyma. Histologically there was only a mild cellular reaction, partly polymorph, partly mononuclear.

In treating these cases, attention was paid to four aspects. In an attempt to control secondary infection, antibiotics were given from the beginning. 'Sigmamycin' (tetracycline and oleandomycin) was apparently the most effective. To control the tachycardia, intravenous 'Lanoxin' (lanatoside C) was administered. Since ketosis was marked, a small intravenous infusion of 50% sucrose solution was given. The remainder of treatment was symptomatic; pethidine and atropine were given for sedation, to reduce secretions, and minimise the effects of right-heart stress. The cough was controlled by 'Benylin.'

In view of the severity of this infection and the frequently fatal outcome in the pregnant cardiac patient, we feel that adequate supplies of the specific vaccine should be made readily available for the inoculation of these patients.

A. D. TELFORD GOVAN
H. R. F. MACDONALD.

Glasgow Royal Maternity and Women's Hospital.

INFLUENZAL PNEUMONIA TREATED WITH CORTISONE AND ANTIBIOTICS

SIR,—I was extremely interested in the letter by Dr. Plaza de los Reyes and his colleagues last week.

I lost my mother a few days ago from influenzal bronchopneumonia confirmed by radiographs of the chest. Antibiotic therapy was pushed to the limit, the antibiotics used being determined by culture and sensitivity of the purulent sputum. Three predominant organisms were cultured—*Staphylococcus aureus* (coagulage-positive strains I and II) and *Hæmophilus influenzæ*.

Unfortunately a profound circulatory failure developed five days before death, associated with an intense pulmonary œdema. 'Neptal' injections, 'Omnopon,' continuous oxygen, intravenous digoxin, &c., produced little clinical response. The heart condition was assessed by repeated electrocardiograms, the overall picture suggesting a toxic myocarditis. The use of cortisone was considered but it was not given, since Friedberg, in his classical book, *Diseases of the Heart*, states that in heart-failure "cortisone and hydrocortisone cause an early renal retention of sodium, despite the fact that there is a rise in glomerular filtration. Unless sodium intake is sharply restricted, their administration may cause œdema, pulmonary œdema, and in fact many of the hæmodynamic disturbances associated with congestive heart failure." It is suggested that "the secretion of these corticoid hormones may actually represent an intermediate mechanism in heart failure."

The problem was—should cortisone be administered if pulmonary œdema complicates the picture? Is it beneficial in cases of toxic myocarditis? What exactly is its mode of action in cases of profound circulatory failure with increasing cyanosis? Is it anti-inflammatory or antitoxic?

Lastly, it would be interesting to know the age-groups of the cases which survived in Dr. Plaza de los Reyes' series.

ISAAC ROSE.

Leeds.

NORADRENALINE IN SHOCK

SIR,—The recent extensive use of noradrenaline in the treatment of various forms of shock does not appear to have led, as it might have done, to a very much clearer understanding of the mechanisms involved in the production and control of the circulatory failures concerned.

The work reported by Dr. Littler and Dr. McKendrick in your issue of Oct. 26 is exceptional in this respect, since their demonstration of the profound effects of the drug on heart rhythm may well explain its failure to restore the circulation in their cases of cardiac infarction. The significance of these observations is emphasised by their further observation that the action of noradrenaline on the cardiac rhythm is abolished by atropine. From the clinical point of view this would suggest that atropine might be given simultaneously with noradrenaline when the latter is employed in cardiac shock, in order to combat its potentially dangerous action on the cardiac rhythm.

Although their "prophylactic" use against the possible development of atrial and ventricular arrhythmias

in cardiac infarction is now largely condemned, atropine and especially quinidine are sometimes used successfully to control certain abnormal rhythms, such as frequent extrasystoles or ventricular tachycardia. So far as I know, however, these drugs have not been used in an attempt to minimise the risk of cardiac arrhythmias arising during the administration of noradrenaline in cardiac or any other form of shock.

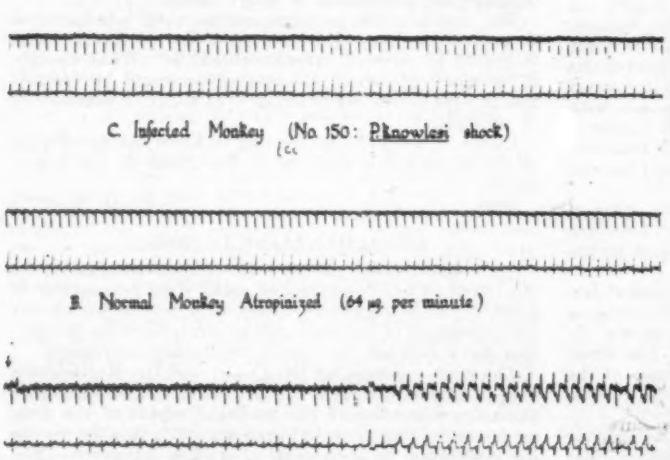
The combination of drugs is surely worth a trial, since it may well be that, other things being equal, the success of noradrenaline in one set of circumstances and its failure in another depend on the predominance or otherwise of its pressor over its cardiac action.

Malarial shock is a case in point. For instance, we have recently found that the circulatory collapse which terminates *Plasmodium knowlesi* infections in rhesus monkeys can be reversed completely by the intravenous administration of small doses of noradrenaline.[1] We have good evidence that this restoration of the failing circulation is achieved almost entirely by the peripheral vasoconstrictor effects of the drugs. Indeed, the vigorous changes in cardiac rhythm which are induced in normal animals by noradrenaline do not appear when it is injected into animals in the late stages of the infection. The same is true for adrenaline. In this respect, therefore, the heart of the infected animal behaves as though it were under the influence of atropine—i.e., as though there was some vagal inhibition induced by the infection.

A similar desirable preponderance of the pressor over the cardiac effect of noradrenaline in the shock of cardiac infarction might be achieved by the simultaneous administration of atropine.

The findings of Dr. Littler and Dr. McKendrick and the notable differences we have observed in the action of both noradrenaline and adrenaline on the heart of the normal and the infected animal have convinced us that a wider study of the pharmacological effects of drugs in disease states is highly desirable. It is to be hoped that more interest will be taken in this field and in the further elucidation of the cardiac and peripheral mechanisms of circulatory failure, which, if cardiac infarction and malaria are any guide, must exist in many patterns.

1. Maegraith, B. G., Devakul, K., Leithead, C. S. *Trans. R. Soc. trop. Med. Hyg.* 1956, **50**, 311.


Continuous injection of Nor-adrenaline (32 µg. per minute)
C. Infected Monkey (No. 150: P.knowlesi shock)
B. Normal Monkey Atropinized (64 µg. per minute)
A. Normal Monkey (M. mulatta)

The action of atropine and of malarial infection on the effects of intravenous injection of *l*-noradrenaline in *M. mulatta*.

(A) 32µg. *l*-noradrenaline i.v., normal animal. Note the disturbance of cardiac rhythm.

(B) 64µg. *l*-noradrenaline i.v., normal animal after atropine. Cardiac effect is abolished.

(C) 32µg. *l*-noradrenaline i.v., infected animal in shock. No cardiac effect.

School of Tropical Medicine, Liverpool.

B. G. MAEGRAITH.

INADEQUACY OF GENERAL ANÆSTHESIA FOR ABDOMINAL OPERATIONS

SIR,—I was surprised to read in Dr. Loder's article (Sept. 7) that he routinely gives 1000 ml. of blood for partial gastrectomies and 500 ml. for cholecystectomies and hysterectomies.

Except in patients with a low hæmoglobin concentration or a depleted blood-volume preoperatively, with modern anæsthesia (with or without autonomic blockade) and reasonable surgical hæmostasis the giving of blood in my view should be the exception and not the rule. The giving of blood routinely for these procedures is surely placing an unnecessary strain on the blood-transfusion service and exposing some of the patients to an unnecessary hazard.

Hull.

W. N. ROLLASON.

MALIGNANT ARGENTAFFINOMA WITH FLUSHING BUT WITHOUT WIDESPREAD SECONDARY DEPOSITS

SIR,—A syndrome of severe flushing of the face after hot drinks, meals, or alcohol, associated with borborygmi, diarrhœa, dyspnœa, and pulmonary stenosis, was first described by Sir Maurice Cassidy[1] in 1930 and has been frequently reported in the past five years. Every case so far has been in a patient with widespread metastatic deposits, particularly in the liver, from a malignant argentaffinoma, usually of ileum.

A man, aged 52, was first admitted with acute small-bowel intestinal obstruction in December, 1955. Laparotomy revealed an ileo-ileal intussusception due to a tumour of the lower ileum. The affected ileum (19 in.) was excised and an end-to-end anastomosis fashioned. An enlarged lymph-node 1·5 in. in diameter at the base of the mesentery was not excised. The man made an uninterrupted recovery. Microscopic examination of the tumour showed that it was a malignant argentaffinoma. He was seen periodically as an outpatient on routine follow-up, and in May, 1957, first complained of severe flushing of the face and neck after hot drinks and food. The flushing was deep red and was accompanied by sweating. The limbs and trunk were not affected. He had noticed in the previous few months noisy abdominal rumblings, but he had not had diarrhœa. He had lost a little weight but his appetite was good and he was not short-winded.

He was a lean man with a purplish complexion. His abdomen showed a well-healed right lower paramedian scar and a mobile lump, the size of a golf-ball, in the peritoneal cavity just below the umbilicus. Bowel sounds were increased; the liver was not felt, nor any deposits in the rectovesical pouch. A radiograph of the chest and an electrocardiogram were normal. There was no evidence of pulmonary stenosis or other heart-disease. The urinary excretion of 5-hydroxyindole acetic acid was 5 or 6 times normal.

Here then was a man with some of the features of the syndrome associated with an increased production of 5-hydroxytryptamine. It was assumed that the source of this excess of 5-hydroxytryptamine was the mesenteric deposit, and a "second-look" laparotomy was decided upon.

Laparotomy (May 27) showed that the mass felt per abdomen was an enlarged mesenteric lymph-node. There were a few minute orange-red peritoneal deposits on the right lateral

1. Cassidy, M. A. *Proc. R. Soc. Med.* 1930, **24**, 139.

pelvic wall near the site of the previous resection, but the liver and all other intra-abdominal organs were normal. A further wedge-resection of the involved mesentery, large lymph-node, and loop of ileum was performed and continuity restored. The tiny adjacent peritoneal deposits made permanent cure unlikely.

During operation the anæsthetist remarked that it was impossible to maintain a good colour despite intubation and high percentage delivery of oxygen. Following operation the man's facial colour became less blue, and there have been no further flushes. His urinary excretion of 5-hydroxyindole acetic acid fell to normal and has remained so. He feels well and is gaining weight. The histological picture was similar to that of the original tumour removed eighteen months previously.

This patient did not have all the features of the fully developed argentaffinoma syndrome, probably because of its early discovery, but had severe face-flushing, pronounced borborygmi, and a raised excretion of 5-hydroxyindole acetic acid. The case is recorded because some features of this syndrome were present, despite the absence of widespread hepatic secondary argentaffin deposits. The features of this syndrome are due to a raised blood-level of 5-hydroxytryptamine, which in this case was produced by a large lymphatic-node deposit in the mesentery. There were no argentaffin deposits in the liver or lungs.

We feel it worth while, at follow-up examinations in cases of malignant argentaffinoma, to examine the urine routinely for increased excretion of 5-hydroxyindole acetic acid and to inquire about flushing and borborygmi, for these may be present before deposits are widespread and may justify a " second-look " laparotomy.

I would like to thank Mr. J. C. F. Lloyd Williamson, for allowing me to present this case.

Brighton. I. S. M. JONES.

TREATMENT OF TUBERCULOUS MENINGITIS

SIR,—I was very interested to read the Scottish Joint Committee's report on the treatment of tuberculous meningitis and to note that when isoniazid was used in high doses the reduction of the duration of intrathecal treatment by streptomycin to one week did not lead to any greater mortality. I note, however, that all the 111 patients did receive intrathecal therapy, and that of the 43 who were planned to have only seven injections an additional 7 required further intrathecal streptomycin treatment. It is, therefore, unjustifiable to conclude the paper with the sentence " The results of the trial indicate that, when isoniazid is included in the chemotherapy, intrathecal streptomycin is not an essential part of the treatment schedule". None of the patients in this series in fact were treated without intrathecal streptomycin.

The Children's Hospital, Sheffield. J. LORBER.

STERILISATION OF SYRINGES BY INFRA-RED RADIATION

SIR,—In your report of Oct. 12 of the proceedings of the Association of Clinical Pathologists, we are quoted as saying that " in a third group (of syringes) when temperatures of 180°C were reached all the tests were sterile." This unfortunately is not correct. For out of 87 tests, even when the temperature exceeded 180°C six positive cultures were obtained, one at a 1-minute exposure, two at 3 minutes, two at 6 minutes, and one at 7 minutes. Syringes heated for more than 7 minutes on 54 occasions were found to be sterile by both anaerobic and aerobic culture.

It was for these reasons that we recommended that if the total heat treatment was 22½ minutes, 11 or more minutes should be at a temperature of more than 180°C.

Central Laboratory, Portsmouth and Isle of Wight Area Pathological Service, Portsmouth.
E. M. DARMADY
K. E. A. HUGHES
W. TUKE.

FATALITY FROM SURGICAL CONDITIONS IN TEACHING AND NON-TEACHING HOSPITALS

SIR,—The article by Dr. Lee and his colleagues (Oct. 14) seems to overlook a possibly important difference between the patients—namely, their social class. In large towns where teaching and non-teaching hospitals are fairly close to each other it often seems that the clientele of the former is, on the average, of a higher social class than that of the latter. If so, the patients attending the teaching hospital might have many advantages—for instance better nutrition, higher intelligence leading to insistence on early and efficient medical aid, &c.

It would be interesting to know if the authors have any data on the social class by occupation (or husband's occupation) of the patients they were considering.

London, S.W.1. ROBERT PLATT.

SIR,—As chairman of the records committee of one of the non-teaching hospitals that contributed to the collection of statistics for the national morbidity inquiry in 1949, I must draw attention to the following facts.

Owing to the reorganisation of the records department which took place that year, with the introduction of a unit system, the returns for the six months of January to June were incomplete. The total of discharges during this period in hospitals of comparable size were :

	Beds	*Total discharges*
Edgware General Hospital	704	4389
Leicester Royal Infirmary	654	*1238*
Chase Farm Hospital	518	3698
Leicester General Hospital	441	3495
St. Woolos Hospital	400	2172

The actual figure of the discharges from Leicester Royal Infirmary from January to June, 1949, was 6668 (the average figure for 1952–54 was 6646).

I feel that these missing cases must invalidate some of the conclusions drawn in the article by Dr. Lee and his colleagues.

As a matter of interest, the figures for cases of acute appendicitis and acute appendicitis with peritonitis for both sexes in 1951 from the Leicester Royal Infirmary were :

	Total cases	*Alive*	*Dead*	*Total mortality* (%)
Acute appendicitis	384	383	1	0·26
Acute appendicitis with peritonitis	132	128	4	3·03

The paper by Dr. Lee and his associates is obviously of the greatest importance and must be gone into more fully by the hospitals concerned. I would like to take this opportunity of making a plea for the fuller development of records departments in non-teaching hospitals, where the production of statistics means many long hours of work for the consultants concerned, in contrast to the better facilities that exist in teaching hospitals.

Leicester Royal Infirmary. J. C. BARRETT.

STRAPPING FOR PLEURAL PAIN

SIR,—Your annotation of Oct. 26 on the value of strapping for the relief of pleural pain prompts me to ask whether this method is still widely used by doctors in this country.

For several years past, I have given up strapping the chest in favour of the simple application to the affected side of warm cotton-wool loosely held in place by a bandage. This I have found to be just as effective as strapping in relieving pleural pain, and senior doctors and nurses who have used both methods confirm my experience.

The objections to strapping are many. It is less comfortable for the patient, local physical signs are obscured, and difficulties may arise if further investigations, such as a chest aspiration, are needed. The removal of the strapping, even by a sympathetic and gentle hand, may cause such agonies (especially to the hairy man) that the pain of the original pleurisy would will-

ingly be endured tenfold. Lastly, many sensitive patients develop rashes and abrasions of the skin at the site of the strapping.

Kaolin poultices, which are preferred by some doctors, are messy and sticky, and sometimes produce blisters and burns.

From your annotation it seems that the rational grounds for using strapping are open to question, and I would suggest that for the prevention of cruelty to the patient it should be given up.

Fulham Hospital,
London, W.6. A. L. WYMAN.

LEFT-HEART CATHETERISATION

SIR,—Your annotation of Sept. 28 prompts us to report our synthesis of two of the techniques you mentioned which provides accurate measurements of the gradients across both the mitral and aortic valves.

First, the needle described by Radner is inserted into the suprasternal notch and advanced into the left atrium. En route it usually traverses either the aorta or pulmonary artery or both. These pressures may be measured. When the tip of this needle is in the left atrium a second needle is inserted into the left ventricle through the chest wall, much as described by Brock.

All 25 of the patients investigated in this manner had mitral or aortic disease or a combination of the two. In all of these, left atrial pressures were obtained; in many aortic and pulmonary-artery pressures were recorded. In contrast to our previous experiences using Fisher's modification of Björk's technique, no hæmothorax or pneumothorax has been encountered nor have we observed any cardiac tamponade. Also we find that using the combined technique more frequently provides the critical information needed.

Further details of this technique are to be published in *Surgery* shortly.

Buffalo General Hospital,
Buffalo, New York. D. G. GREENE
G. T. GRIFFITH.

ACROPARÆSTHESIÆ AND THE CARPAL-TUNNEL SYNDROME

SIR,—Any explanation of acroparæsthesia in terms of either compression of the median nerve in the carpal tunnel or of the thoracic-inlet syndrome, must surely take account of the fact that these cases can be relieved equally by shoulder-girdle exercises or by decompressing the median nerve in the carpal tunnel. As a general practitioner, I have treated over seventy of them by shoulder-girdle exercises with reasonable success: they sometimes relapse after months or years, but the same treatment will cure them again. Admittedly most of them were probably milder than the selected cases that a neurologist would tend to see.

Dr. Heathfield (Oct. 5), discussing his 80 cases of acroparæsthesia, says "In only 4 cases was the diagnosis of median-nerve compression in doubt. These were treated successfully with shoulder-girdle exercises, but, as their symptoms were identical with those of the others, it seems probable that they too had medium-nerve lesions." And no doubt they too could have been treated equally successfully by operation on the carpal tunnel, but the real point is that they *were* treated successfully by shoulder-girdle exercises.

The explanation surely must be that in these cases the median nerve is a tight fit in the carpal tunnel: the fit is made even tighter and symptoms produced if œdema of the other structures in the tunnel occurs. Such œdema can be produced by vascular compression at the level of the thoracic inlet, and relief of symptoms can be effected either by relieving the pressure at the thoracic inlet or by decompressing the median nerve in the carpal tunnel.

Felsted, Essex. PETER A. WALFORD.

ILEOSTOMY CHEMISTRY

SIR,—In their letter of Aug. 24, Mr. Crawford and Mr. Brooke quote a paper of ours[1] dealing with the chemical composition of ileostomy fluid. They felt that they were largely unable to compare their results with ours because we measured ileostomy discharge by weight and not volume. We deliberately chose the gravimetric method because we considered it more accurate, having regard to the comparative technical difficulties of volumetric and gravimetric analysis, and the use to be made of the data.

We have been mainly interested in the amount of sodium and potassium lost from an ileostomy. The concentration of these elements in the total volume of ileostomy fluid was only of secondary interest. Indeed, as we shall show later, it is doubtful whether volumetric measurement of the concentration can often be more than a rough approximation.

By our gravimetric technique, ileostomy discharge was collected directly through an adhesive 'Polythene' bag with a tail into tared Winchester quarts or aluminium cans and the daily output determined by weight. With liquid specimens, thorough mixing was readily achieved by repeated inversions of the Winchester quarts or by mechanical stirring of the contents of the aluminium cans. In either case, weighed aliquots were taken for analysis.

In a volumetric method, the ileostomy discharge could be collected in the same way and its volume measured by transference to a measuring cylinder, or by marking the contained volume. A volume aliquot would be taken for analysis. By this method certain sources of error are present which are absent from the gravimetric method. It is impossible to empty the receptacle containing the ileostomy dejecta completely. With very liquid discharges the error is small, but with many samples a significant amount of material remains in the receptacle. To remove this involves washing out, thus complicating the technique. Further, the volume must often be measured in large cylinders, thus introducing errors of the order of 2% or more. Finally, the transfer by means of a pipette or syringe of a volume aliquot for analysis is not an accurate procedure and the error involved may exceed 5% with semi-liquid samples.

The accuracy of the gravimetric method depends only on the accuracy of measurement of the ileostomy discharge and the aliquot. The container, empty and full, can be weighed to 1 g. with ease on a Berenger type of balance and the aliquot, about 1–5 g., can be weighed accurately on an ordinary chemical balance. The cumulative errors of this technique are less than 0·5%.

A further complication sometimes arises. The ileostomy discharge may never be liquid, and, when it is at the start, often becomes semi-solid and mucoid later. We have found it impossible to handle this material by a volumetric technique without great loss of accuracy.

In regard to the question of electrolyte concentration, to determine this it is clear that the water content of the ileostomy dejecta must be known. As can easily be shown, for very liquid samples weight and volume are equally satisfactory approximations to the water content. In semi-liquid samples, the water content is variable and may be as low as 90% (by weight). If accurate electrolyte concentrations are required under these conditions, the only possible method is to determine the water content of the fluid.

Taking all factors into consideration, particularly where measurement of the daily loss of ileal electrolytes is the purpose of the investigation, there can be little doubt that a gravimetric procedure is the technique of choice.

In their original paper[2] Crawford and Brooke report ileostomy discharges containing 200–400 mEq. per litre. We have not found such high values in any of our cases. We hope to publish our results shortly.

West Middlesex Hospital,
Isleworth, Middlesex. M. LUBRAN
N. F. COGHILL
P. M. MCALLEN.

1. Coghill, N. F., Lubran, M., McAllen, P. M., Edwards, F., Richenberg, C. S. *Gastroenterologia*, 1956, **86**, 724.
2. Crawford, N., Brooke, B. N. *Lancet*, 1957, **1**, 864.

MITRAL STENOSIS WITH PULMONARY HYPERTENSION

SIR,—In a recent paper Evans and Short [1] conclude that, in cases of mitral stenosis complicated by severe pulmonary hypertension, "mitral valvotomy is unlikely to produce material or lasting benefit for the arterial changes which they show appear to be progressive and irreversible." This is based on the appearances in post-mortem arteriograms and histological sections. In support an unpublished finding is cited that, among 42 patients with mitral stenosis and pulmonary hypertension submitted to valvotomy at the London Hospital, in no instance had the electrocardiographic signs of right ventricular hypertrophy disappeared despite successful splitting of the valve.

A year ago we reported 6 such cases of which 5 were operated upon.[2] 1 patient died twelve hours after operation, but the 4 survivors, all in functional group IV prior to surgery, are still alive—3 in group I, and 1 in group II. 2 of these patients were re-catheterised within four weeks of operation in an attempt to ascertain the time required for the pressures to fall; in 1 the mean pulmonary arterial pressure had fallen from 70 to 40 mm. Hg, whilst in the other the right ventricular systolic pressure had fallen only slightly from 170 to 140 mm. Hg. Evans and Short consider that these figures confirm their conclusions. Now, however, a year later, both these patients are alive and well, and in both the electrocardiograms have returned almost to normal. They have not been catheterised a third time but the electrocardiographic changes are a good index of altered pulmonary dynamics.

We consider that the data Evans and Short have obtained, valuable though they are, are not of an order permitting inference on function; and, whatever the cause, these very high pressures can frequently be lowered. We are not alone in this view: Evans and Short themselves, after reviewing the literature, state: "there is no doubt that very high pressures may fall to near normal levels"—a statement with which we completely agree and one at variance with their final conclusion. We believe that this conclusion of Evans and Short is incorrect and may lead to many patients being denied the benefit of operation. This would be a tragedy in a group which, without surgery, has such a poor prognosis.

Department of Cardiology, The Royal Infirmary, Manchester. J. MACKINNON
E. G. WADE.

HIGH-PRESSURE OXYGEN AND RADIOTHERAPY

SIR,—There are many ways in which the behaviour of cancer cells differs from that of normal cells; indeed, if this were not so radiotherapy would be useless. It seems reasonable to hope that the painstaking exploration and exploitation of these differences will ultimately provide us with therapeutic weapons much more effective than those we now possess, and from this point of view Dr. Loxton's letter (Sept. 28) is of great interest.

It is important to remember, however, that the use of high-pressure oxygen in radiotherapy is based on the assumption that cancer cells behave very much as do normal ones in the way in which their sensitivity to radiation is related to the oxygen tension in their environment. This relationship, which Gray [3] has shown to follow a common pattern in cells of many different types and origins, is such that oxygen deficiency will result in a very considerable decrease in radiosensitivity while exposure to excess oxygen will have but little effect. Thomlinson [4] has shown that in many tumours some cancer cells exist, because of circulatory conditions, at very low oxygen tensions. If the shield which lack of oxygen provides for these cells can be removed, the inherent difference in radiosensitivity between cancer cells and normal ones reappears and they become accessible to therapeutic radiation. It would suffice if extra oxygen could be brought to these cells alone, but this is not feasible. Nor is it practicable, as Dr. Targowsky (July 27 and Sept. 14) proposed, to oxygenate only the tumour or part of the body. The incidental exposure of previously well oxygenated cells, whether cancerous or normal, to high oxygen tensions does not, however, much alter their sensitivity, and the gain, therefore, is a differential one.

It may be true, as Dr. Loxton surmises, that the tissue rH rises with the oxygen tension. Other factors (for instance, the increased pCO_2) affect the pH of blood in vivo under these conditions, and the experiments he suggests would need to be carried out to give an answer. If he were found to be correct, two further steps would be needed before one could logically expect chemical means of raising the rH to potentiate radiotherapy. The first would be to establish the existence of a relationship between the tissue rH and radiosensitivity. The second would be to show that any relationship was such that raising the rH would not result merely in increasing the radiosensitivity of all cells equally. Only then could it be truly said that "the conditions in the tissues caused by increased oxygen pressure could be imitated . . ." by the methods he suggests.

Department of Anæsthesia, Hartford Hospital, Connecticut. CYRIL SANGER.

ACUTE RENAL FAILURE AFTER INTRAVENOUS PYELOGRAPHY

SIR,—Mr. Roy and Dr. Dormandy and her colleagues (July 6) report cases of acute renal failure following aortography and renal angiography respectively. Dr. Dormandy and her colleagues suggest that previous intravenous pyelography may have been responsible for the impairment of renal function after the renal angiography. Bartels et al.,[1] Myhre et al.,[2] and Killmann et al.[3] have described acute renal failure after intravenous pyelography in 4 patients with multiple myeloma. In these patients renal function had previously been good. Much albumin was excreted in the urine, azotæmia developed, and the patients died within a few days or weeks. A sudden impairment of the renal circulation, on the one hand, and intratubular obstruction due to albuminuria, on the other, were thought to be responsible, although in Killmann et al.'s patient necropsy revealed no substantial changes in either the tubules or the glomeruli. In Roy's patient the urography gave rise to necrosis of the renal cortex.

We record here the sequel to intravenous pyelography in a man of 61 with the nephrotic syndrome.

He had had massive albuminuria (up to 16 g. per 1000 ml., Esbach), and the sediment contained a few leucocytes and hyaline casts; specific gravity 1025–1030. The total serum-protein was 4·5 g. per 100 ml., (albumin 2·1 g. and globulin 2·1 g.). Electrophoretic analysis showed albumin 38·3%, $alpha_1$-globulin 5%, $alpha_2$-globulin 20·1%, beta-globulin 10·6%, gamma-globulin 26%. Serum-cholesterol 332 mg. per 100 ml., creatinine clearance 79 ml. per min., blood-non-protein-nitrogen 33 mg. per 100 ml. Blood-pressure had been 160/100 mm. Hg for years. Treatment with corticotrophin and cortisone several times resulted in a disappearance of œdema and a loss in weight of 17 kg.

Renal function deteriorated slowly and the patient was readmitted because of nephrolithiasis and renal colic. A plain radiograph of the kidney revealed no stone shadow, but

1. Evans, W., Short, D. S. *Brit. Heart J.* 1957, **19**, 457.
2. Mackinnon, J., Wade, E. G., Vickers, C. F. V. *ibid.* 1956, **18**, 449.
3. Gray, L. H. *Brit. J. Radiol.* 1953, **26**, 609. Gray, L. H., et al. *ibid.* p. 638.
4. Thomlinson, R. H., Gray, L. H. *Brit. J. Cancer* 1955, **9**, 539.

1. Bartels, E. D., Brun, G. C., Gammeltoft, A., Gjørup, P. A. *Acta med. scand.* 1954, **150**, fasc. IV, 397.
2. Myhre, J., Brodwall, E. K., Knutsen, S. B. *ibid.* 1956, **156**, fasc. IV, 263.
3. Killmann, S.-A., Gjørup, S., Thaysen, J. H. *ibid.* 1957, **158**, fasc. I, 43.

chromocystoscopy showed no excretion of indigo on the right side, and slight bulging of the right ureteral orifice was found to be caused by a small intramural stone. The stone was eliminated by provoked water diuresis and high doses of spasmolytic drugs.

The pain and microscopic hæmaturia disappeared, and another chromocystoscopy showed the indigo appearing at six minutes on both sides. The creatinine clearance was 34 ml. per min., and the blood-non-protein-nitrogen 42 mg. per 100 ml. To discover any remaining stone in the urinary tract, intravenous pyelography was performed. After conjunctival, intradermal, and intravenous tests, 20 ml. of 'Triopac' (200 mg. iodine per ml., in a 32·3% solution) was injected in five minutes. Pale excretion appeared in both kidneys, but no calculus was visible. After the pyelography anuria developed, and the bladder was empty for twenty-four hours. Ample volumes of fluid were given, intravenous procaine infusion was started, and paravertebral procaine block was performed twice a day. On consecutive days urine output was 120, 200, 200, 350, 600, 660, 800, and 600 ml. The blood-non-protein-nitrogen increased gradually to 105 mg. per 100 ml. Five days after pyelography the creatinine clearance was 2 ml. per min. and the specific gravity of the urine did not exceed 1010. Five weeks after pyelography, the blood-non-protein-nitrogen was 34 mg. per 100 ml. and creatinine clearance 35 ml. per min. The specific gravity of the urine varied from 1007 to 1012, and albuminuria was slight. The patient was discharged symptom-free.

We report this case to call attention to the fact that intravenous pyelography may be dangerous in cases of renal disease, even when renal function is relatively good.

3, Medical Clinic, University of Budapest. JÚDITH SZÉKELY.

SUBSTANCE MASQUERADING AS ALDOSTERONE

SIR,—In the course of an investigation into the determination of aldosterone we tested the urine of two patients whose adrenal glands and ovaries had been removed on account of mammary cancer and who were maintained on cortisone.

We used the method of Neher and Wettstein[1] (extraction with chloroform at pH 1, paper chromatography in the system of Zaffaroni and in the systems B5 or C of Bush). With the soda-fluorescent reaction we found, much to our surprise, a spot where in normal persons we expected aldosterone. It could be shown that this spot was caused by an unknown

System	Cortisone	Hydrocortisone	Aldosterone	Compound X
Zaffaroni ..	2·44	1	2·44	2·47
Bush-C ..	1·40 ±0·05	1	1	0·95
Bush-B5 ..	1·52 ±0·07	1	1·29 ±0·02	1·18 ±0·04
E2B ..	1	0·86 ±0·06	0·71 ±0·05	1·18 ±0·08

material (compound X) which behaved in several chromatographic systems like aldosterone, but could be separated from it by chromatography in the system E2B[2]. In the accompanying table some Rf values are summarised (for technical reasons these values are expressed in relation to the Rf of cortisone —or hydrocortisone).

Compound X slightly reduced blue tetrazolium. The ultraviolet absorption spectrum has a maximum at 240mμ; in concentrated sulphuric acid ultraviolet light was absorbed with a maximum at 280 and 440mμ and a minimum at 230mμ. The biological properties of compound X have not yet been investigated.

Small amounts of compound X were later found in the urine of patients with nephrotic syndrome, parkinsonism, and Sheehan's syndrome. But the largest quantity of this substance was extracted from the urine of a patient erroneously considered to have primary aldosteronism.

The patient was an unmarried woman, aged 25, with lassitude, anorexia, and vomiting. Her blood-pressure was normal. Serum-potassium ranged between 2·5 and 3·8 mEq. per litre. In the urine we found on several instances 20–30μg. of a substance which we considered identical with aldosterone. It was noted, however, that the soda-fluorescent reaction yielded much higher estimations than staining with blue tetrazolium. At the moment we paid little attention to this detail. On surgical exploration (Prof. J. F. Nuboer), the right adrenal appeared to be larger than the left and was removed. Neither tumour nor cortical hyperplasia was found. Following the operation, there was only slight, if any, clinical improvement.

When some months later the urine of this woman was examined again, we found that it contained normal amounts of aldosterone but a considerable quantity of compound X.

It seems probable that there is a connection between this patient's symptoms and signs and the excretion of compound X. On the other hand, the fact that compound X was found in the urine of adrenalectomised oöphorectomised women maintained on cortisone suggests either an origin outside the adrenal and the ovary or a formation of compound X in the metabolism of cortisone.

The physico-chemical properties of compound X make it possible that it is identical with compound III of Nowaczynski[3]. But compound III has been reported to promote sodium excretion in adrenalectomised rats and to have no influence on urinary potassium. The patient described above, however, had severe hypokalæmia and no signs of sodium loss.

These studies are being made possible by a grant from the Netherlands Organisation T.N.O. We are also grateful for help by Ir. J. J. Walraven, of the laboratory of N. V. Organon, Oss.

Medical Department and Department of Theoretical Endocrinology, University of Utrecht, Holland. ANTONIA M. C. VAN ZEELST
F. SCHWARZ
ANTONIA K. FAST.

INTRARECTAL IMPLANTATION OF THE UTERUS

SIR,—We wonder whether any of your readers have seen or heard of a case like this.

A Bengali Muslim woman, aged 28, was admitted here in severe pain. She said that she had never menstruated normally. She had been married at the age of 9 and had no children. For some years she had had irregular periods of 3–4 days when she had severe lower abdominal pain followed by a menstrual flow per rectum. For 2 months before admission the pain had been worse, and she had noticed a swelling of the lower abdomen.

She had a swelling, about the size of a 16-weeks pregnancy, arising from the pelvis. The vagina ended blindly and no cervix could be felt; the vagina was separate from the swelling, which seemed, on rectal examination, to be attached to the anterior wall of the rectum above the examining finger. Next day she menstruated per rectum; the flow seemed normal but lasted only 2 days.

She had a normochromic anæmia, malaria parasites in a blood-smear, albumin and casts in the urine, and a blood-pressure of 190/100 mm. Hg.

At laparotomy six days after admission, the uterus was enlarged. The ovaries lay behind it, adherent to it and to the peritoneum over the sacrum. The lower pole of the uterus was 3 in. distant from the vault of the vagina; it was implanted in the rectum just below the recto-sigmoid junction. The relationship was confirmed by one of us inserting two fingers vaginally while another defined the lower pole of the uterus. The peritoneum was reflected off the upper surface of the bladder in the usual way, over the vault of the vagina instead of the uterus, then over the rest of the pelvis and uterus.

The uterus was separated from the rectum by a circular incision, a gush of gas confirming that the uterus was indeed attached to bowel. The wound was sutured with catgut, the pelvis covered with peritoneum, and the abdomen closed. Postoperative progress was uneventful save for a temperature of 100°F which responded to antimalarials, and a small pelvic hæmatoma which caused no discomfort and soon resolved. The specimen was 9 cm. long and 8 cm. between cornua; there was no cervix, endometrium was scanty, and the surface which had been next to the rectum was covered with bowel mucosa.

1. Neher, R., Wettstein, A. *J. clin. Invest.* 1956, **35**, 800.
2. Eberlein, W. R., Bongiovanni, A. M., *Arch. Biochem. Biophys.* 1955, **59**, 90.
3. Nowaczynski, W., Sandor, T., Koiw, E., Genest, J. Meeting of the Endocrine Society. New York, 1957.

The developmental anomaly seems to have been a failure of the müllerian ducts to unite with the urogenital sinus. According to Frazer and Bloomfield,[1] the vagina is formed by the canalisation of the caudad portion of the fused müllerian ducts, but Zuckerman[1] maintains that the urogenital sinus plays a larger part, which seems to fit in with the anomaly in our patient.

I. T. PATRICK
E. D. CONNAN
A. K. HALDER.

Christian Mission Hospital, Rajshani, East Pakistan.

TOXIC REACTIONS AFTER INTRAVENOUS IRON

SIR,—I read with great interest the article by Dr. Ross (July 13).

I have used intravenous iron very widely in my hospital practice both for primary iron-deficiency anæmias and for iron-deficiency anæmias secondary to protein malnutrition.

I would like to point out that if intravenous iron is given on a completely empty stomach in the morning, no untoward reaction occurs. I have also noted if by mistake the patient is given milk or even tea with milk he is likely to have a reaction.

Sheth Lallubhai Gordhandas General Hospital, Maninagar, Ahmedabad, India. J. T. BHATT.

AN OBJECTIVE METHOD OF DETERMINING AGE IN THE NEWBORN

SIR,—An objective assessment of the age of the newborn is desirable for several reasons. In obstetrics, for example, safe age determination is a prerequisite for the study of perinatal mortality. In pædiatrics a clear demarcation is needed between premature, mature, and postmature babies. Finally, there is a medico-forensic interest in a reliable and precise method of age determination. Such a method is lacking at present. Calculations based on the weight and length of newborn babies show that these data are inapplicable in practice for this purpose.[2]

Fœtal blood contains two different types of hæmoglobin (Hb), fœtal and adult, which differ in the rate of alkali-denaturation[3-5] and in several other respects.[6] The fœtal-Hb fraction gradually decreases during the latter half of the pregnancy.[3 7 8] This was thought to indicate a possible approach, on the working hypothesis that there is a close correlation between the age of the newborn child and the proportion of fœtal Hb in its blood.

61 blood samples, obtained from the umbilical cord immediately after birth, have been analysed. The rate of alkali denaturation was determined spectrophotometrically and the relative amounts of the different types of Hb were calculated according to the method of Betke.[6] The age of the baby was calculated from the first day of the last menstruation. Only cases where this date could be given exactly have been included.

The correlation[9] between the proportion of fœtal Hb and the age of the newborn infant was highly significant (see table; $P<0.001$). The correlation coefficient, however, was rather low and the 95% confidence interval discouragingly long (±33·7 days).

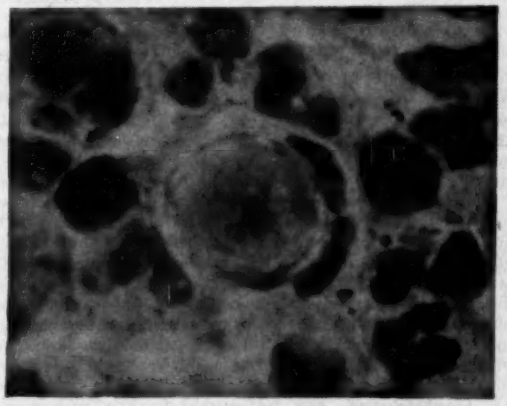
The original line of thought did not therefore lead to a practical method of determining age. In an attempt to reduce the considerable scatter of the Hb values, these were in each case divided by the weight of the baby. The correlation between the age and the quotients thus obtained was then calculated. The correlation coefficient was much increased, and the 95% confidence interval correspondingly decreased. Further precision in the method was obtained by logarithmic transformation of the quotients. The functional relationship between these logarithms and the age was evaluated, and the standard error of the estimate in terms of the 95% confidence interval was ±18·3 days.

This seems to be a reliable and convenient method for determining age and maturity of the newborn. A more detailed presentation of these results will be given elsewhere.[1] The possibility is being investigated of further increasing the accuracy of the method through the study of other mathematical transformations and the statistical analysis of curvilinear regressions. The clinical applicability outlined above is being tested in a larger series.

Department of Women's Diseases and Department of Pathology, Karolinska Sjukhuset, Stockholm, Sweden. SAM BRODY.

LUPUS-ERYTHEMATOSUS CELLS

SIR,—The lupus-erythematosus (L.E.) cell was described by Hargraves et al.[1] in 1948, and it is now generally accepted that L.E. cells can be demonstrated, with rare exceptions, only in bone-marrow and peripheral-blood preparations of patients with disseminated lupus erythematosus. But their presence has been reported in other conditions—e.g., viral hepatitis, leukæmia, multiple myeloma, hæmolytic anæmia, pernicious anæmia, miliary tuberculosis, dermatitis herpetiformis, and penicillin hypersensitivity.



L.E. cell in a swab from acute tonsillitis; × 1000

While examining a film from a tonsillar swab from a boy aged 5 years with acute follicular tonsillitis, I found

1. Cited by Johnston, T. B., Whillis, J. Gray's Anatomy; p. 191, London, 1942.
2. Brody, S. *Acta obstet. gynec. scand* (in the press).
3. Körber, E. Dissertation. Dorpat, 1866. Quoted by Betke (ref. 5).
4. Wakulenko, J. L. *Pap. med.-chem. Lab. Univ. Tomsk*, 1910, 2, 1. Quoted by Bischoff (ref. 4).
5. Bischoff, H. *Z. exp. Med.* 1926, **48**, 472.
6. Betke, K. *Biochem. Z.* 1951, **322**, 186.
7. Beaven, G. H., Hoch, H., Holiday, E. R. *Biochem. J.* 1951, **49**, 374.
8. Zeisel, H. *Z. Kinderheilk.* 1951, **70**, 190.
9. Hald, A. Statistical Theory with Engineering Applications. New York, 1952.

1. Hargraves, M. M., Richmond, H., Morton, R. *Proc. Mayo Clin.* 1948, **23**, 25.

SURVEY OF RESULTS OF STATISTICAL ANALYSIS

Variable	b	r *	s *	Equation of regression line *	95% confidence interval in days †
Fœtal Hb (%)	−0·3811 ($P<0.001$)	0·3692	35·73	−0·3811x + 110·47	±33.7
Fœtal Hb / Weight (kg)	−0·2969 ($P<0.001$)	0.5425	10·52	−0·2969x + 47·52	±22·6
log [Fœtal Hb / Weight]	−0·0068 ($P<0.001$)	0·7715	0·0038	−0.0068x + 1·949	±18·3

* Provisional scale: 90 = 280 days after the first day of the last menstruation.
† Calculated on the basis of an observed y-val = ney.

in the purulent exudate numerous cells which, morphologically are like L.E. cells (see fig.). The patient was in perfect health from every point of view, except for this transitory attack of tonsillitis.

On the hypothesis that the enzyme desoxyribonuclease acts on the nuclei of the neutrophils, it might be suggested that this enzyme could be released in purulent exudates, and acts on the pus cells (neutrophils), in cases which have nothing to do with lupus.

Clinical Pathology Department,
Faculty of Medicine,
Alexandria. H. BARSOUM.

SECOND THOUGHTS ON ANTICOAGULANT TREATMENT FOR MYOCARDIAL INFARCTION

SIR,—Dr. Stark Murray (Oct. 26) is riding for a fall. I have some experience [1 2] of the method he advocates. It is advisable to examine under the microscope a centrifuged specimen of the patient's urine every time the prothrombin index is estimated. I am no antagonist of the Russell's viper venom method of conducting these estimations with "Stypven" when in good hands. "Stabilisation" of a patient on phenindione ("Dindevan") by treatment for a few weeks under supervision in hospital—where the dose can be regulated to individual needs—is quite feasible.

"Home-made" thromboplastin from post-mortem material is preferable to any commercial product.

Universal treatment of these cases with anticoagulants is undoubtedly life-saving; accidents, however, will happen.

St. Margaret's Hospital,
Epping. FRANK MARSH.

MEPROBAMATE

SIR,—Like Dr. Sparup (Oct. 19), I have been investigating the effects of various drugs on spastic patients. Meprobamate is one of the drugs on trial. The patients to whom it has been given are 14 adult defectives with gross spasticity, with or without athetosis. In these patients it is not easy to assess changes in degree of spasm, but no remarkable alteration has been observed.

But in three patients, severe athetosis has been much improved: two women, aged 24 and 20, are now able to do much more for themselves, and the range and violence of their movements have become less; a man, aged 32, is now, for the first time in his life, able to feed himself. The dose of meprobamate necessary to produce this effect has been 400 mg. two or three times a day, and the improvement has been noticeable within a few days of starting treatment. On the higher dose a patient may become drowsy; the drowsiness may be relieved by amphetamine, but unfortunately the movements then return with their former severity.

A supply of 'Equanil' was kindly made available by Messrs. John Wyeth.

St. Lawrence's Hospital,
Caterham, Surrey. J. GIBSON.

EFFECT OF *d*-TUBOCURARINE CHLORIDE ON BLOOD-PRESSURE OF ANÆSTHETISED PATIENTS

SIR,—Dr. Langton Hewer's interesting comments last week on Dr. Thomas's article of Oct. 19, about which an explanation is sought for a rise in blood-pressure following the administration of curare in 12% of anæsthetised patients, bring one or two thoughts to mind.

I hesitate to enlarge on Dr. Hewer's remarks, but surely it is an established pharmacological fact that curare, in common with many other drugs acting upon the nervous system, first stimulates before it depresses. This property manifests itself, in the case of curare, at the preganglionic sympathetic nerve endings at which, initially, a nicotine-like (stimulant) effect is produced prior to synaptic block taking place.

1. *Brit. med. J.* 1946, ii, 963; *ibid.* 1947, ii, 748; *ibid.* 1948, ii, 319; *ibid.* 1948, i, 1207; *ibid.* 1950, ii, 305.
2. *Lancet*, 1951, ii, 785; *ibid.* July 6, 1957, p. 44.

In the majority of patients, this initial stimulant effect is presumably quite transitory, but in those whose blood-pressure is markedly labile, could not the initial rise be accounted for on these grounds?

Moorfields Eye Hospital,
London, E.C.1. WILLIAM A. D. COMBE.

AN INFLUENZAL SUGGESTION

MRS. ELLESTON TREVOR, of Roedean House, Roedean Way, Brighton, writes:

"We have quite a pleasant room with its own bath going begging here, and my husband and I would be delighted to offer a couple of weeks' hospitality to any doctor who has been more than normally overworked as the result of the influenza epidemic. We have most of the mod. cons., I think, except television."

Medicine and the Law

A Difference of Diagnostic Opinion not Negligence

A WOMAN patient underwent an operation for cystic mastitis in her left breast. Postoperatively a hæmorrhage occurred and later a hæmatoma formed and a many-tailed bandage was applied. A hospital pathologist who examined a portion of the cyst reported that the microscopic appearance was of an intraduct carcinoma in the area of cystic hyperplasia. Subsequently a mobile cyst was found in the right breast. After the patient left hospital she attended Mount Vernon Hospital for deep X-ray treatment. When the head of the pathology department returned from leave he examined the slide and the patient was informed that she did not have cancer. The patient claimed damages against the surgeon, the regional hospital board, and the hospital management committee, alleging negligence in the operative and postoperative treatment. She alleged that the surgeon was negligent in not reopening the wound, that the wrong type of bandage had been applied, so that she suffered great pain, and that it caused the mobile cyst. The patient also claimed damages against the pathologist alleging negligence in his diagnosis. A witness for the plaintiff (Sir Hugh Griffiths) gave evidence to the effect that he could find nothing wrong with the operative or postoperative treatment. He would have prescribed the use of a many-tailed bandage after such an operation because it could be taken off with the minimum of disturbance to the patient. The patient then called another witness (Sir Cecil Wakeley), who said that he would have opened the hæmatoma, drained it, and not applied a bandage, but he agreed that it depended on the size of the hæmatoma and that it was reasonable for a surgeon to take another view.

Counsel for the plaintiff then said that it would not be right to continue the case with relation to the operative and postoperative treatment, and the surgeon was discharged from the case.

The patient had also alleged that the pathologist negligently interpreted the slide so that he reported that there was microscopic evidence of intraduct carcinoma, and she relied on the evidence of Dr. J. M. Sheriff who said that in his view the slide did not disclose evidence of intraduct carcinoma. Prof. R. W. Scarff, giving evidence for the defendants, said that in his view there was evidence on the slide which supported the report originally made by the hospital pathologist.

Mr. Justice HILBERY said that the allegation of negligence against the surgeon had been abandoned. Bandaging was a perfectly proper course and there was no evidence to support the contention that it caused the cyst in the right breast. There was positive evidence that there was no failure to exercise reasonable care in the patient's treatment and therefore that part of her claim failed.

Regarding the other part of the case, there were two possible views. One was that the hospital pathologist was right; if so there was no possibility of negligence and what followed was the proper thing. The other was that two pathologists had come to a different view on the slide; in such circumstances it was wrong to say that because a pathologist took one view and not the other, he must be negligent. His Lordship, however, accepted Dr. Scarff's evidence; but it was clear that today the patient did not have carcinoma. Accordingly there would be judgment for the defendants.

Crivan *v.* Barnet Group Hospital Management Committee.—*Queen's Bench Division:* Hilbery J. Oct. 25, 1957. Gerald Gardiner, Q.C., and Frederick Hallis (Denton, Hall & Burgin); Cyril Harvey, Q.C., and Gordon Friend (Merton Hones, Lewsey & Jefferies); Rose Heilbron, Q.C., and Reginald Barr (Hempsons); James Cumming Bruce and Audrey Jennings (Hempsons); James Stirling, Q.C., and Arnold de Montmorency (Tickle & Co.).

C. J. ELLIS,
Barrister-at-law.

Obituary

CLIFFORD WHITE

M.D. Lond., F.R.C.P., F.R.C.S., F.R.C.O.G.

Mr. Clifford White, consulting obstetric surgeon to University College Hospital, London, died on Oct. 24 at the age of 76.

He was the second son of the late S. C. White of Hampstead, and he was educated at University College and University College Hospital. He qualified in 1904 and after holding house appointments he became obstetric registrar and tutor at University College Hospital in 1910. He had already taken the F.R.C.S., and two years later he was appointed surgeon to Queen Charlotte's Hospital and also joined the honorary staff of the Samaritan Hospital for Women.

He was elected to the staff of University College Hospital on the retirement of Sir George Blacker in 1925, and his advice and help proved especially valuable when the obstetric unit was set up the following year. He also held appointments at the Metropolitan Hospital and St. Mary's Hospital, Plaistow, and was examiner to many universities both at home and abroad, to the Royal College of Surgeons, and to the Royal College of Physicians, which had elected him to its fellowship in 1924. With his election as F.R.C.O.G. in 1929 he joined the small group who hold the fellowship of the three colleges. He was also an active member of the obstetric section of the Royal Society of Medicine, and was its president in 1936.

Besides all his hospital work, he had a large private practice, particularly in the years between the wars. Despite this busy life, he managed to find time to write many articles and to share in the authorship and editorship of the *Ten Teachers, Midwifery* (1948) and *Diseases of Women* (1949). He also wrote the section on malignant diseases of the vulva in Lowrie's *Text Book of Gynæcology* (1953).

After he retired from the staff of U.C.H. he continued to give valuable help to the old students' association and to its council, and the association showed its appreciation by making him its president a few years ago.

No formal record of a career can give a true picture of a man, but in the following personal memoirs from his friends Clifford White's ability and character are clearly reflected.

L. W. writes:

While he was attached to the Belgian Army in 1914, and doubtless as the result of the influence of Wilfred Trotter, Clifford White dealt with many head injuries and became a most competent cerebral surgeon. And again, during the late war he and a medical colleague, who is now still active at U.C.H., lived in the hospital during practically the whole war, kept the hospital and its students' activities running, and were a tonic to the morale of the whole institution. In these years his versatility was again apparent, for he often had to turn his hand to surgery that was not strictly gynæcological. Stories are told of how he was once seen doing an operation for hydrocele in one of his own labour wards.

In his earlier days at Queen Charlotte's he was interested in abnormal uterine action, and it was his researches in this subject that clarified the difference between contraction and retraction ring of the uterus. At the Samaritan Hospital he worked with Cuthbert Lockyer, whose technique he greatly admired, and it was the influence of this splendid surgeon that made him change from the leisurely operating style of his old teachers at U.C.H. to the more rapid style which he trained himself to use so well, particularly in the abdomen. There was no better operator for a case of the frozen pelvis sometimes found in endometriosis or pelvic tuberculosis. He was deeply interested in this latter subject, published works upon it, and was always ready to tackle difficult operations. This was in the days before streptomycin and P.A.S., and heroic surgery, in which he was really expert, was often called for. His other great interest, this time obstetrical, was the use of decapsulation of the kidney in severe eclampsia or in a concealed accidental hæmorrhage. Today obstetricians have generally discarded this technique, but who knows who will eventually be proved right? It may be that renal ischæmia can be helped by the treatment that Clifford White used to advocate.

He was a splendid teacher, and his dogmatic presentation of a subject tremendously impressed the students. They were also susceptible to his slightly original ideas of dress and some of his typical postures when teaching—such as gripping the lapels of his coat with both hands and laying down the law in no uncertain terms. But though dogmatic and often obstinate he was always considerate, polite, and kind to colleagues, students, and nurses. Many of the nurses will tell of his unostentatious help to impoverished patients. Scores of students will remember gratefully his hospitality, notably the parties at his own home, and other gatherings for tennis, swimming, and dancing, at all of which he was a skilled performer. The recognition of his character and ability by his colleagues was shown by his election to the fellowship of University College.

V. B. G.-A. writes:

Fifty years have passed since first I met Clifford White at the Samaritan, where he was registrar and assistant to Cuthbert Lockyer. Time changed him little, and I can recall his telling me that though Lockyer taught him surgical speed and dexterity it was Herbert Spencer who grounded him in the humanities and drilled him not only to be punctilious in note-taking but to become an apostle of the more scientific complete hysterectomy rather than to follow the common herd who only did subtotals, like their brethren the general surgeons. I think Clifford would have succeeded in any career, for he had a first-class methodical brain and took infinite pains over those boring things, details. On a long motor trip he would earmark every road-gradient and hostelry, and he never liked to stray far from a four-starred mansion in the Michelin guide-book; for had he not a wonderful nose for bouquet and an expert's tongue for vintage wines whether they derived from the Côte d'Or or Aquitaine? In his younger days he was a formidable dancer and skier, but latterly world travel in the winter months with his wife had been his foible. Whether in Africa or the Americas they delighted to meet people, and the two of them together were charming and generous mixers in every manner of society.

Clifford was not of those who always pulls moonbeams out of the past; indeed it was not often he discussed things gone, for he was a great reader and much preferred to try to visualise the customs and science of the future—*The Times* library could hardly keep up with his demands for solid pabulum. It was my habit to go for a walk with him on a Sunday morning. His family, his garden, his life, all made for happiness, and maybe that is why I never heard him say a mean thing about anyone, though often caustic about ill-advised financial projects. He was a big man and a lovable one who, even though on the side-lines, had an elder statesman's value when consulted. He has cultivated his garden and has passed, leaving us his debtors.

Mr. White married in 1911 Miss Elaine Mawe of Charterstowers, Queensland. She survives him with a son and a daughter.

REGINALD MYERS ATWATER

M.D. Harvard, M.P.H., Dr.P.H. Johns Hopkins

As executive secretary of the American Public Health Association since 1935, Dr. Atwater had travelled widely and was known and appreciated by many of his colleagues in this country.

He was born in Canyon City in 1892, and he received his early education at Colorado College. In 1918 he graduated M.D. from Harvard University, and after holding an internship at Peter Bent Brigham Hospital in Boston he took his degrees in public health at Johns Hopkins Hospital. In 1921 he went to China as associate professor of preventive medicine and hygiene at Hunan-Yale College of Medicine at Changsha. He returned to the United States in 1925, and for the next two years he was an instructor in preventive medicine and in epidemiology at Harvard University. In 1927 he was appointed commissioner of health for Cattaraugus County in Olean, New York. He held this post until he took up his appointment with the association in 1935. He was also for many years managing editor of the *American Journal of Public Health*, a consultant to the United States Public Health Board, and a member of the board of the National Health Council.

In 1939 he received the Cuban order of Carlos J. Finlay and in 1949 an honorary degree of Colorado College. He was also awarded the Sedgwick medal of the association which he served, and in 1952 he was elected an honorary fellow of our own Society of Medical Officers of Health. He died on Oct. 18.

R.H.P. writes:

As executive secretary to the A.P.H.A. for over a quarter of a century Rex held a strategical position and with his inexhaustible energy he made full use of it. He travelled far and wide throughout the world without thought of sparing himself. His hospitality and generosity will be remembered by a host of British friends, for his home was always open to visitors. He was proud of his family of three daughters and two sons, all married, and eleven grandchildren. One of the great pleasures he gave his friends was a picture at Christmas of this fine family. He gave his whole life unsparingly and generously to the service of the human race.

Dr. Atwater is survived by his widow and their five children. One of his sons is Dr. John B. Atwater, of the United States Public Health Service.

Appointments

BARRON, JOHN, M.B. Aberd.: assistant psychiatrist (S.H.M.O.), Aycliffe Hospital, Heighington, Darlington.

MCCALLUM, J. R., M.B. Edin., F.R.C.S.E.: consultant E.N.T. surgeon, Edinburgh northern group of hospitals and Royal Hospital for Sick Children, Edinburgh.

MCLELLAND, JAMES, M.B. Edin., D.M.R.T.: consultant radiotherapist, Royal Infirmary and Western General Hospital, Edinburgh.

MARSLAND, MARGARET L., M.R.C.S.: M.O. (maternity and child welfare), Manchester.

MATTINGLY, STEPHEN, M.B. Lond., M.R.C.P., D.PHYS.MED.: assistant physician, department of physical medicine and rheumatism, Middlesex Hospital, London.

OLDHAM, J. S., D.M. Oxon, M.R.C.P.: consultant paediatrician, Birmingham (Dudley Road) group of hospitals.

SMITH, R. J. H., M.S. Lond., F.R.C.S., D.O.: part-time consultant ophthalmic surgeon, St. Mary's Hospital and Paddington General Hospital, London.

Colonial Appointments:

DA COSTA, G. I. B., M.B. Madras, F.R.C.S.: surgeon specialist, Western Nigeria.

GILBERT, W. T. M., L.R.C.P.I.: senior M.O., St. Helena.

KUGELGEN, K. B., M.D. Marburg: M.O., Northern Nigeria.

MUKHERJEE, R. K., M.B. Calcutta, D.P.H.: M.O.H., Trinidad.

STEWART, K. M., M.B. Edin.: M.O., Uganda.

Births, Marriages, and Deaths

BIRTHS

ANDERSON.—On Oct. 20, to W. Ainslie Anderson, F.R.C.S., F.R.C.S.E., and Eileen Anderson, M.B., D.A. (née Davis)—a son, William George.

BAIRD.—On Oct. 17, at Jessop Hospital, Sheffield, Yorks, to Ivy, wife of Dr. Ian McLean Baird—a son, John Neil Rose, brother for Fiona.

LENNOX.—On Oct. 23, at Irvine Central Hospital, Ayrshire, to Dr. Elizabeth Leslie Lennox (formerly Handasyde), wife of Dr. Ian Gordon Lennox, a brother for Lynda—Ian Bruce.

Notes and News

THE STATE OF FOOD AND AGRICULTURE

THE Director General of the Food and Agriculture Organisation of the United Nations, in his annual report [1] for 1957, records a steady increase in agricultural production. A feature of the past few years has been the way in which this increase has been greatest in underdeveloped countries. Thus, compared with the average for 1948–52, the estimate for 1956–57 shows a rise of 20% in net food output for the less economically developed and of 15% for the most developed regions of the world. Most of this increase is offset by a corresponding increase in population. In the underdeveloped regions the indications are that increases in food-supply are just holding their own with the increased numbers to be fed. Thus, any progress in raising national levels is for the most part negligible. Inadequate and unbalanced diets are still the common lot of more than half the world's population.

As in previous years, the annual report is used to review particular aspects of the problems of food-supply. This year there is a detailed survey of the relation between income and food consumption. This is based on a detailed analysis of surveys in 14 countries, including underdeveloped ones such as Ghana and India, and wealthy countries such as Sweden and the U.S.A. In each country there is a very close association between income and the type of diet consumed. As soon as a family rises above the poverty level, cereal consumption falls, and there is a progressive increase, with rise of income, in consumption of meat, milk, fruit, and vegetables. When expenditure on these articles of diet is plotted against total family living expenditure on a logarithmic scale, the points for different income groups fall approximately on a straight line over a very wide range of countries. The uniformity of this relationship in different countries is remarkable.

The conclusion is drawn that there can be no increase in nutritional standards without an increase in income. In urban populations, until productivity is raised and the general run of the people earn higher incomes, any substantial improvement of nutrition is unlikely. But improvements for special groups, such as expectant and nursing mothers and children of school and preschool age, can be achieved by nutritional education and special welfare schemes without a general rise of income. The importance of wages in determining nutritional levels is emphasised in a table in the report which shows that the average Indian factory worker has to work 2·9 hours a day to earn enough for a satisfactory but not luxurious day's diet; his counterpart in the United States has to work only 0·2 hours. The analysis also indicates that in countries with rising economic levels there are likely to be sharp rises in the demand for the better types of food. If these are not anticipated and met by agriculturalists, they will set up inflationary strains. Many factors—social and religious among them—determine the types of food a family eats, but economic considerations appear to be the most important.

The report also includes a review of the changes in land-ownership. Conditions of land tenure are continually changing in all countries, but in Eastern Europe and in India these changes have been at revolutionary tempo in the past decade. The nature of the land tenure is bound up with the availability of agricultural credit and there has recently been a great increase in agricultural cooperatives in many countries. Medical readers will find this section difficult going; yet in many countries these considerations are fundamental to the health of the people.

INDUSTRY AND PHILANTHROPY

IN a Royal Institution discourse given on Oct. 25, Mr. M. W. Perrin, chairman of the Wellcome Foundation Ltd., spoke of the "very remarkable—and almost unique—combination of industry and philanthropy which is represented by the profit-making Wellcome Foundation on the one hand—with its Burroughs Wellcome alias—and its shareholders and owners, the Wellcome Trustees, on the other." There is, he said, only one other instance (the Carlsberg Breweries in Denmark) in which all the profits that can be made available from a competitive commercial enterprise are used for purely philanthropic or academic ends.

1. The State of Food and Agriculture 1957. F.A.O. Rome. Pp. 71. Obtainable from H.M. Stationery Office, price 10s.

Mr. Perrin retold the story of how Henry Wellcome, born in the United States in 1853, came to England in 1880 to join Silas Burroughs, another American, in partnership. Burroughs' thesis for his Philadelphia examination had been on the compression of medicinal powders, and Wellcome coined and registered the word 'Tabloid'. It was Wellcome who showed so much foresight in promoting research, starting the Wellcome Physiological Research Laboratories as long ago as 1894. The connection of the research laboratories and the business was not at first very clear: "perhaps Wellcome's own thinking was confused between his desire to acquire wealth and his intention to use it for the benefit of mankind." But very valuable work was done in the laboratories; and, when Burroughs died, and Wellcome acquired sole control, he in 1924 combined all his interests under the name of the Wellcome Foundation; and by his will he left all his shares in it to the Wellcome Trust. With Sir Henry Dale as its chairman since 1938, the Trust has devoted over a million pounds to medical and allied work. Research professorships and scholarships have been founded, museums and libraries have been housed, and research grants have been made and specialised apparatus lent in support of important projects in many different countries.

LUNG DISEASE IN COALMINERS : NEW RESEARCH

Of the dangers to life in coal mining, pneumoconiosis takes a high place. Many doctors will be pleased to learn that the second survey in the National Coal Board's pneumoconiosis field research project will include a simple pulmonary function test (the fast vital-capacity test) as well as chest radiography.[1] A more complex battery of tests would be impracticable in a survey on this scale.

Research at Hammersmith on small animals has shown that lesions indistinguishable from "progressive massive fibrosis" can be induced by the introduction of tubercle bacilli and coal-dust into the lungs without any siliceous matter. In Kentish mines a mounting bacterial content has been found in the air as it passes along the coal face, and an extremely high count (much higher than that in a busy office) at the beginning of the return airway. These unexpected findings may have an important bearing on complicated pneumoconiosis.

FIRST INTERNATIONAL BIOCLIMATOLOGICAL CONGRESS

WHILE many branches of science are splitting into small specialised groups, the International Society for Bioclimatology and Biometeorology was founded in 1956 to bring together all scientists who are concerned with the influence of climate upon life. It held its first congress in Vienna on Sept. 23–27. About 100 people attended from North America, Asia, Africa, and many parts of Europe. Papers were presented by engineers, physicists, botanists, zoologists, physiologists, physicians, and veterinary surgeons, and by many specialised workers from subdivisions of these fields, covering such varied subjects as town-planning in the Sahara, forestry in Poland, milk production in hot countries, acclimatisation to heat, cold, and high altitudes, and the effects of environment on the incidence of asthma or the spread of poliomyelitis. Those communications which stated the problems and achievements of any particular field of study were generally the most successful, and they were invariably followed by lively comments or questions from workers in other fields of research. Members of the congress were apparently aware, however, of the dangers inherent in a society whose members may talk about things which some of the audience cannot critically scrutinise, and a few attempts at presenting unsubstantiated theories were clearly identified as such by those who were familiar with the subject.

The chairman of the congress was Dr. Fred Sargent, professor of physiology in the University of Illinois (who is now spending a year at the Medical Research Council's climate and working efficiency research unit in Oxford). The secretary of the Society is Dr. S. W. Tromp of Leyden University. Dr. J. L. Cloudsley-Thompson, of the department of zoology, King's College, London, was elected to the council of the Society. The Society publishes the *International Journal of Bioclimatology and Biometeorology*, and the proceedings of the congress will appear in the journal.

The second International Congress of Bioclimatology will be held in 1960, and England or Scotland have been mentioned as possible places. Information about the Society may be obtained from Dr. S. W. Tromp, Hofbrouckerlaan 54, Oegstgeest, Leiden, Holland, or from its representative in Great Britain, Dr. E. M. Glaser, Department of Physiology, The London Hospital Medical College, Turner Street, London, E.1.

1. Rogan, J. Research on Medical and Allied Problems. Annual Report for 1956. National Coal Board, Hobart House, Grosvenor Place, London, S.W.1.

"ILLS AND BILLS" SCHEME

THE Hospital Saturday Fund has started a new scheme of hospital benefits which will help members to pay for expenses, not connected with actual treatment, that arise during a stay in hospital.

The contribution to the scheme will be £4 a year for a member with dependants and £3 for a member without dependants. A member while he is in a hospital or a nursing-home, whether he is paying for his treatment or not, will receive a weekly benefit of 6 guineas for thirteen weeks in any year (3 guineas for a wife and £1 11*s.* 6*d.* for each child). Grants of up to 8 guineas in any one year will also be made towards fees for specialist consultations and radiological or pathological examinations.

Details of the scheme may be had from the secretary of the Fund, 14, Holborn, London, E.C.1.

University of Oxford

On Oct. 17 the degree of B.M. was conferred on A. J. MacI. Smith.

University of Cambridge

On Oct. 19 the following degrees were conferred:

M.B., B.Chir.—T. R. C. Brodie, H. J. Hoyland, K. A. A. Mourin, *S. G. Sutton.

M.B.—C. C. Cory, *S. F. Kuvin, *Enid Wharton.

* by proxy.

Royal College of Physicians of London

On Tuesday, Nov. 12, at 5 P.M., at the college, Pall Mall East, London, S.W.1, Dr. Ronald Bodley Scott will give the Langdon-Brown lecture. His subject will be the chemotherapy of malignant disease.

Royal College of Surgeons of Edinburgh

At the annual meeting of the college, held on Oct. 16, the following office-bearers were elected for the coming year:

President, Prof. John Bruce; vice-presidents, Prof. N. M. Dott and Mr. W. W. Galbraith; secretary, Mr. C. W. A. Falconer; treasurer, Mr. J. J. Mason Brown; president's council, Mr. David Band, Mr. R. S. Barclay, Mr. J. R. Cameron, Mr. I. L. Dick, Mr. E. L. Farquharson, Mr. A. J. C. Hamilton, Prof. W. A. Mackey, Mr. T. McW. Millar, Dr. D. Miller, Mr. J. A. Shepherd, and Mr. R. Leslie Stewart; representative on the General Medical Council, Mr. K. Paterson Brown; conservator of museum, Prof. D. E. C. Mekie; convener of museum committee, Prof. R. J. Kellar; hon. librarian, Dr. Douglas Guthrie.

Royal College of Physicians of Ireland

The following officers have been appointed for 1957-58:

President, Dr. F. J. O'Donnell; vice-president, Dr. R. B. Pringle; censors, Dr. R. B. Pringle, Dr. B. Alton, Dr. E. de Valera, Dr. M. Crowe; representative on the General Medical Council, Dr. E. T. Freeman; registrar, Dr. Charles Dickson; treasurer, Dr. Geoffrey Bewley.

Royal Australasian College of Physicians

At a meeting of the council held in Sydney on Oct. 15 the following were admitted to membership:

W. G. Grigor, D. A. Handley, B. R. M. Hurt, J. McRae, R. A. Mellick (New South Wales), G. W. Crock, D. J. Fone, N. B. Pinkus, B. A. Smithurst, G. R. Wagner (Victoria), B. T. Emmerson, G. A. Hocker, K. J. Murphy (Queensland); P. R. Hodge, S. Posen (South Australia); H. J. H. Colebatch, A. M. Rankin (Western Australia); J. C. H. Morris (Tasmania). R. W. Hawker (Queensland) was admitted under the special provisions of article 37.

American College of Surgeons

Prof. Ian Aird, professor of surgery at the Postgraduate Medical School of London, and Prof. John Bruce, regius professor of clinical surgery at Edinburgh University, received the honorary fellowship of the American College of Surgeons at a recent meeting of the college in Atlantic City, N.J.

College of General Practitioners

On Saturday, Nov. 16, at 11.30 A.M. at B.M.A. House, Tavistock Square, London, W.C.1, Dr. D. M. Hughes will give the fourth James Mackenzie lecture. His subject will be Twenty-five Years in Country Practice.

London Medical Exhibition

Sir Bennett Hance, medical adviser to the Secretary of State for Commonwealth Relations, will open this exhibition on Monday, Nov. 18, at 11.30 A.M. at the Royal Horticultural Society, Greycoat Street, Westminster, S.W.1. The exhibition will be open from 11 A.M. to 6 P.M. daily (7.30 P.M. on Thursday) till Nov. 22.

Royal Society of Health

Lord Cohen of Birkenhead has accepted nomination as president of the society; the election will take place at the annual meeting in May, 1958.

National Association for the Prevention of Tuberculosis

NAPT is to hold two afternoon symposia in B.M.A. House, Tavistock Square. Carcinoma of the Lung will be discussed on Nov. 22, and Cardiac Problems for General Physicians on Dec. 6. Admission is by ticket (price 10s.) available from NAPT, Tavistock House North, Tavistock Square, London, W.C.1. The association is offering a scholarship of £350 to enable a British chest physician to visit Canada for three to six months in 1958. Applications should reach the Secretary-General by Dec. 31.

Royal Photographic Society

Medical group—Prof. Michael Boyd will open a fortnight's exhibition by this group at 16, Princes Gate, London, S.W.7, on Thursday, Nov. 7, at 7.30 P.M. Five new awards are announced for the annual competition, and Professor Boyd will present the ten now available. Medical practitioners interested in clinical photography are invited to attend.

Hobbies Exhibition

The Benger Doctors' Hobbies Exhibition will be held in the Royal Society of Health's exhibition hall at 90, Buckingham Palace Road, London, S.W.1, from Nov. 18 to 22. It is expected that some 360 doctors will be participating. It will open at 2.30 P.M. on Monday, the 18th, and at 10 A.M. on later days, closing at 7 P.M. Doctors and their friends are invited.

Scarcity of Physiotherapists

AT a meeting of the Norwich, Lowestoft, and Yarmouth Hospital Management Committee (*Eastern Daily Press*, Oct. 15), a report by the medical advisory committee expressed serious concern at the inadequacy of physical treatment at the Norwich hospitals, caused, it was said, by lack of physiotherapists. Mr. H. S. Matthes, the chairman, said that hospital technicians were not particularly well paid, but it should not be taken for granted that the only reason for the shortage was low pay. Dr. G. C. Gaynor thought that physiotherapists were underpaid, that the public suffered, and that the Government or the Whitley Council should be "pushed to see the matter in its proper light."

Society of Medical Officers of Health

At the annual dinner in London on Oct. 24 the toast of The Society was proposed by Sir Edward Boyle, parliamentary secretary to the Ministry of Education. Recalling that it was now fifty years since the school health service began as a national service, he remarked that people outside the service often asked whether there was still a need for a special health service for schoolchildren now that there was a National Health Service freely available to them. Sir Edward thought the answer was clearly "yes": teachers ought to have advice on the spot from doctors specially interested in child health and development and with personal experience of the day-to-day working of a school. The medical supervision of handicapped children was highly specialised work that could be done satisfactorily only by doctors working in schools. And there was the whole matter of health education, as yet only in its infancy. Sir Edward said he had been enormously impressed by the work being done in the special schools for the physically handicapped, the deaf, and the partially sighted. He thought that more parents were becoming far happier at the thought of their children attending these schools, which were often delightful buildings, splendidly equipped, in bright and airy surroundings. Sir Edward spoke appreciatively of the Society's work and he expressed the thanks of the Ministry of Education for all the help it had received from the Society. The president, Dr. H. D. Chalke, whose address earlier in the day is the subject of annotation on p. 883, responded. He spoke of some of the difficulties of M.O.H.s, whom he liked to think of as coordinators of the National Health Service. They were particularly worried about radioactivity: they were not being taken sufficiently into the confidence of the Ministries and the authorities concerned. Matching modern dilemmas with modern metaphor, Dr. Chalke declared that the Society was not a satellite but an integral part of the solar system, and it showed no sign of losing height and disintegrating. The Guests were welcomed by Dr. H. M. Cohen, and Sir John Charles replied.

Research Defence Society

On Thursday, Nov. 28, at 5.30 P.M. at University College, Gower Street, London, W.C.1, Lord Cohen of Birkenhead will give the Stephen Paget lecture entitled Some Reflections on Animal Experiments.

Prof. W. Melville Arnott has been admitted to the honorary fellowship of the Royal College of Physicians and Surgeons of Canada.

Diary of the Week

NOV. 3 TO 9

Sunday, 3rd

UNIVERSITY COLLEGE HOSPITAL, Gower Street, W.C.1
10.15 A.M. Prof. Charles Dent: Renal Stones, Their Ætiology, Symptoms, and Prevention.

Tuesday, 5th

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.C.1
8.30 P.M. *Orthopædics.* Dr. Joseph Barr (Massachusetts): Tendon Transplants in Poliomyelitis and in Obstetrical Palsy.

BRITISH POSTGRADUATE MEDICAL FEDERATION
5.30 P.M. (London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.) Prof. J. V. Dacie: Acquired Hæmolytic Anæmia.

ST. MARY'S HOSPITAL MEDICAL SCHOOL, London, W.2
5 P.M. Mr. F. E. Stabler: Endometriosis.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, Gray's Inn Road, W.C.1
5.30 P.M. Prof. Gösta Dohlman (Lund): Treatment of Pharyngeal Diverticulum.

INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5.30 P.M. Dr. P. F. Borrie: Circulatory and Vascular Reactions.

ROYAL ARMY MEDICAL COLLEGE, Millbank, S.W.1
5 P.M. Mr. E. G. Tuckwell: Operations on the Sympathetic Nervous System.

Wednesday, 6th

ROYAL SOCIETY OF MEDICINE
5.15 P.M. *History of Medicine.* Prof. Henry McIlwain: Thudichum and the Medical Chemistry of the 1860s to 1880s.

POSTGRADUATE MEDICAL SCHOOL, Ducane Road, W.12
2 P.M. Dr. S. W. Stanbury: Renal Function.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY
5.30 P.M. Dr. Imrich, Dr. D. A. Osborn, Dr. Samuel Epstein: Clinico-pathological conference.

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. R. W. Riddell: Tinea Capitis.

INSTITUTE OF DISEASES OF THE CHEST, Brompton, S.W.3
5 P.M. Mr. Vernon Thompson: Constrictive Pericarditis.

INSTITUTE OF NEUROLOGY, National Hospital, W.C.1
5.30 P.M. Dr. R. A. Henson: Localised Infection and Infestation.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
3.30 P.M. Dr. J. D. N. Hill: The Epileptic in the Community.

ASSURANCE MEDICAL SOCIETY
5 P.M. (11, Chandos Street, W.1.) Mr. W. A. Mills: Ear, Nose, and Throat Diseases—A Survey.

MANCHESTER MEDICAL SOCIETY
4.30 P.M. *Medicine.* (Medical School, University of Manchester.) Wing-Commander Frederick Latham: Medical Problems of Flight.

MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (18, Nicolson Street.) Mr. W. Q. Wood: President's Valedictory address.

Thursday, 7th

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.1
5 P.M. Prof. A. J. Lewis: Between Guesswork and Certainty in Psychiatry. (Bradshaw lecture.)

UNIVERSITY OF LONDON
5 P.M. (St. Mary's Hospital Medical School, London, W.2.) Dr. Burrill B. Crohn (New York): Life History of Regional Ileitis.

ROYAL SOCIETY, Burlington House, Piccadilly, W.1
4.30 P.M. Prof. Wilson Smith: Virus-host Cell Interactions. (Leeuwenhoek lecture.)

BRITISH POSTGRADUATE MEDICAL FEDERATION
5.30 P.M. (London School of Hygiene and Tropical Medicine.) Dr. Hermann Lehmann: Variations in Hæmoglobin Synthesis.

INSTITUTE OF OBSTETRICS AND GYNÆCOLOGY
4.30 P.M. (Chelsea Hospital for Women, S.W.3.) Mr. John Howkins: Advanced Carcinoma of the Cervix and its Treatment.

LIVERPOOL MEDICAL INSTITUTION
5 P.M. (University of Liverpool.) Prof. William Doolin: The Tale of the Ligature.

HONYMAN GILLESPIE LECTURE
5 P.M. (University New Buildings, Teviot Place, Edinburgh.) Mr. A. W. Wilkinson: The Basis of Healing.

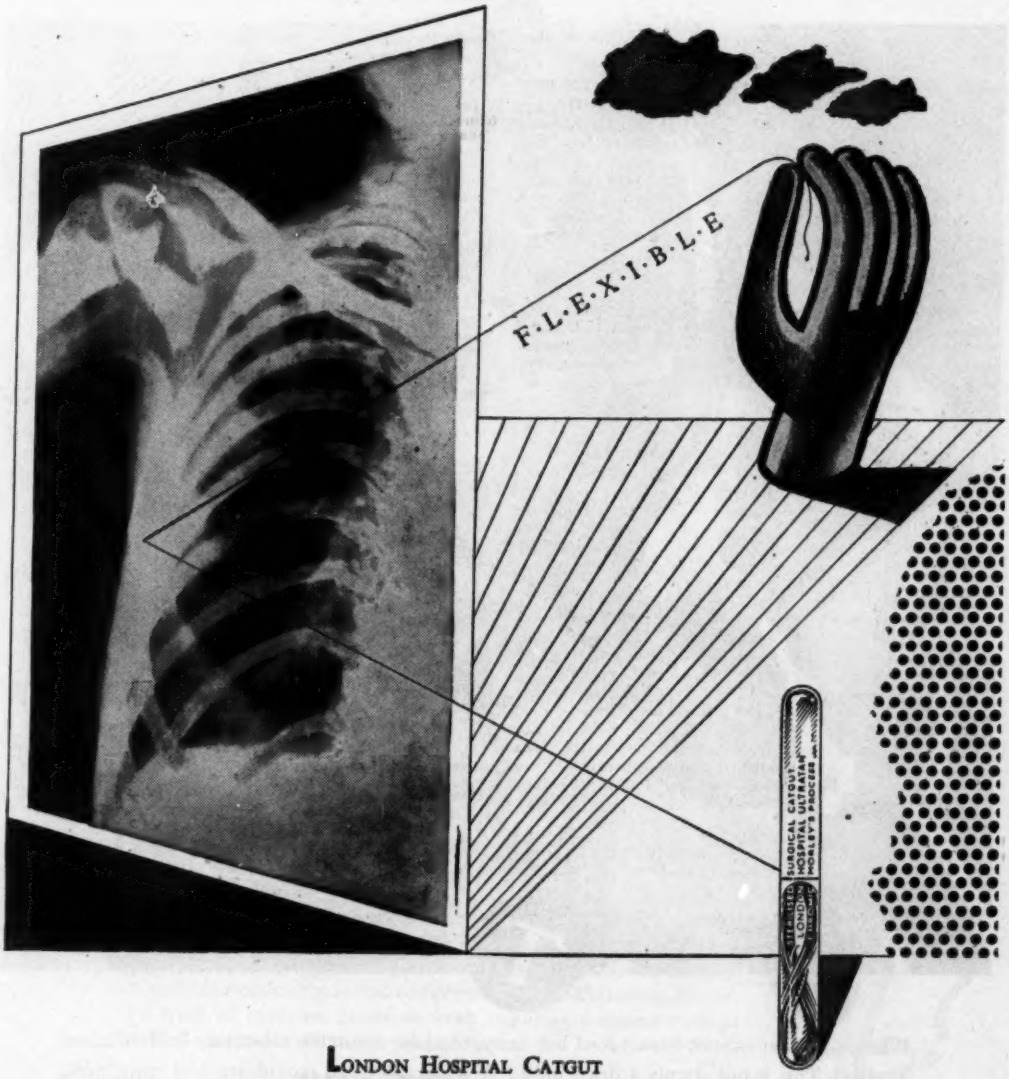
Friday, 8th

POSTGRADUATE MEDICAL SCHOOL
10 A.M. Prof. M. F. A. Woodruff: Methods of Skin Replacement with Special Reference to the Use of Homografts.
4 P.M. Prof. Alastair Frazer: Differential Diagnosis and Treatment of Steatorrhœa.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY
3.30 P.M. Mr. Maxwell Ellis: Nasal Catarrh.

Saturday, 9th

INSTITUTE OF OBSTETRICS AND GYNÆCOLOGY
11.15 A.M. (Queen Charlotte's Hospital, W.6.) Mr. Alistair Gunn: Use and Value of Kielland's Forceps.



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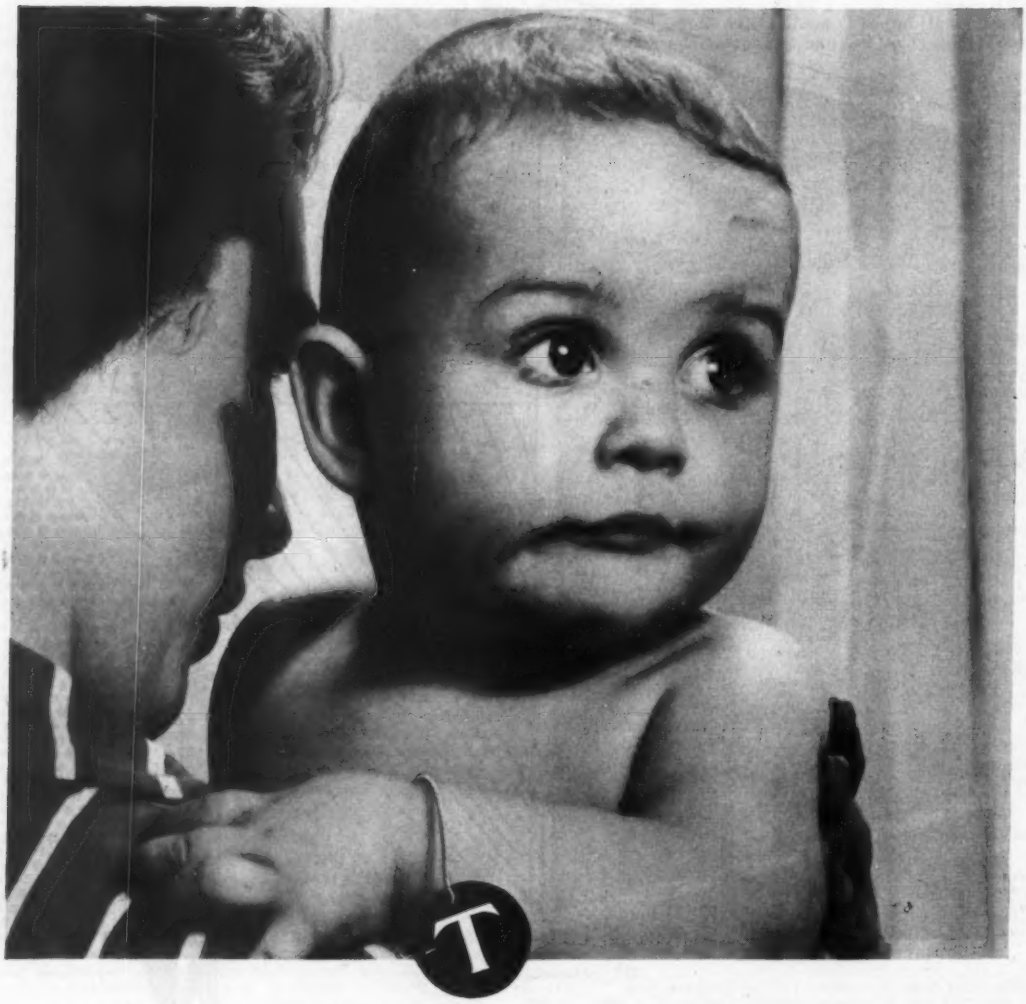

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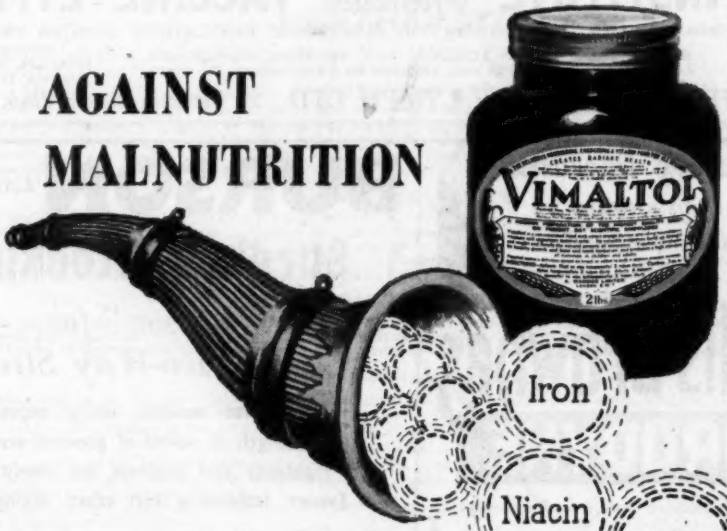

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ACADEMIC AND EDUCATIONAL SECTION — Page 37

ADMINISTRATIVE
Leeds R.H.B. Regional Psychiatrist — 38

ANÆSTHETICS
Royal National T.N. & E., W. Reg. — 40
St. Mary Abbots, W.8. Reg. — 40
Birmingham United Hosps. Sr. H.O. — 42
Bishop Auckland. Gen. Sr. H.O. or Jr. H.M.O. — 41
Cambridge United Hosps. Sr. H.O. — 42
Cardiff United Hosps. Reg. — 42
Douglas. Noble's Isle of Man. Sr. H.O. — 43
Leeds. R.H.B. Locum Regs. — 44
Newcastle R.H.B. Sr. Reg. — 45
St. Albans City. Locum Reg. — 47
Scotland. Northern R.H.B. Sr. H.M.O. — 39
Sheffield United Hosps. & R.H.B. Sr. Reg. — 46
South Cheshire H.M.C. Sr. H.O. — 47
South East Met. R.H.B. Reg. — 47
Winchester. Royal Hants County. H.O. — 48
U.S.A. Brooklyn, N.Y. Anæsthesiologists — 39

CASUALTY
Royal Northern, N.7. Sr. H.O. — 40
Ashton, Hyde & Glossop H.M.C. Jr. H.M.O. — 41
Blackburn Royal Infy. Jr. H.M.O. or Sr. H.O. — 42
Blackpool. Victoria. Sr. H.O. — 42
Bournemouth. Royal Victoria. Sr. H.O. — 42
Cardiff. St. David's. Sr. H.O. — 42
Chertsey. St. Peter's. Sr. H.O. — 43
Epping. St. Margaret's. Sr. H.O. — 43
Huddersfield Royal Infy. Jr. H.M.O. or Sr. H.O. — 44
Ilford. King George. Sr. H.O. — 44
Llanelly. Sr. H.O. — 44
Northwood, Middx. Mount Vernon. Sr. H.O. — 46
Oxford United Hosps. Reg./Research Asst. — 46
Rochester, Kent. St. Bartholomew's. Sr. H.O. — 46
Sheffield R.H.B. Sr. Casualty Officer — 39
Sutton & Cheam. Sr. H.O. — 47
Warrington Infy. Jr. H.M.O. — 48
Watford. Peace Mem. Sr. H.O. — 48

CHEST AND TUBERCULOSIS
Highlands Gen., N.21. Reg. — 40
Cardiff. Glan Ely. Sr. H.O. — 42
Leeds R.H.B. Reg. — 44
Manchester R.H.B. Reg. — 45
Oxford R.H.B. Reg. — 46
Scotland. Northern R.H.B. Reg. — 47
Scotland. Western R.H.B. Sr. H.M.O. — 39

DENTAL SURGERY
Guy's, S.E.1. P.-t. Cons. — 38
Cambridge United Hosps. P.-t. G.P. — 42

DERMATOLOGY
Scotland. Western R.H.B. Reg. — 47

EAR, NOSE, AND THROAT
Ashford, Middx. H.O. — 41
Sheffield R.H.B. P.-t. Cons. — 39
Shrewsbury. Eye, Ear & Throat. Sr. H.O. — 47

GERIATRICS
St. Francis', S.E.22. Sr. H.O. — 40
Blackburn & Dist. H.M.C. Jr. H.M.O. — 42
North West Met. R.H.B. Cons. — 38
Reading & Dist. H.M.C. Sr. H.O. — 46
Scotland. Western R.H.B. Sr. H.M.O. — 39

INFECTIOUS DISEASES
Irvine. Ayrshire Central. Jr. H.M.O. — 44
Leeds R.H.B. Reg. — 44
Stockport. Cherry Tree. Sr. H.O. — 47

MEDICINE
Royal Northern, N.7. Reg. — 41
St. Mary's, W.2. P.-t. O.-P. Assts. (G.P.) — 40
Tottenham Group H.M.C. H.O. — 41
Beverley. Westwood. H.O. or Sr. H.O. — 41
Bournemouth & East Dorset H.M.C. Pre-reg. H.O.'s — 42

Brighton Gen. Pre-reg. H.O. .. 42
Brighton. New Sussex Hosp. for Women. H.O. 42
Bury St. Edmunds. West Suffolk Gen. H.O.'s & Locum H.O.'s .. 42
Chichester. St. Richard's. Reg. .. 43
Epsom Dist. H.O. & Pre-reg. H.O. .. 43
Huddersfield. St. Luke's. Sr. H.O. .. 44
Ilford. King George. Pre-reg. H.O. .. 44
Ipswich & East Suffolk. Pre-reg. H.O. 44
Ipswich & East Suffolk. H.O. .. 44
Leamington Spa. Warneford Gen. H.O. 45
Leeds R.H.B. Reg. 44
Leeds R.H.B. Reg. 45
Leeds R.H.B. Locum Regs. 44
Newmarket Gen. H.O. 45
Newcastle R.H.B. & United Hosps. Sr. Reg. 45
Oxford R.H.B. Reg. 46
Plymouth. South Devon & East Cornwall. Pre-reg. H.O. 46
Reading Area Dept. of Med. H.O.'s.. 46
Scotland. Western R.H.B. Regs. .. 47
Scotland. Western R.H.B. Sr. Regs. & Regs. 47
Slough. Upton. Locum Reg. .. 47
Stoke-on-Trent. City Gen. H.O. .. 47
Watford. Shrodells. H.O. 48
Westcliff, Essex. Sr. H.O. 48
Winchester. Royal Hants. County. Pre-reg. H.O. 48
Windsor. King Edward VII. Pre-reg. H.O. 48
Canada. Reddy Mem., Westmount, Montreal. Resident 48

NEUROSURGERY

Birmingham. Midland Centre for Neurosurgery. Sr. H.O. 41
Haywards Heath. Hurstwood Park. Sr. H.O. 43
Sheffield United Hosps. Reg. .. 46

OBSTETRICS AND GYNÆCOLOGY

Hosp. of St. John & St. Elizabeth, N.W.8. H.O. 40
Birmingham R.H.B. Reg. 42
Birmingham United Hosps. Reg.. 41
Birmingham United Hosps. Reg. .. 42
Blackburn. Queen's Park. H.O. .. 42
Bury St. Edmunds. West Suffolk Gen. H.O. 42
Canterbury. Kent & Canterbury. H.O. 43
Chelmsford. St. John's. H.O. .. 43
Chesterfield. Scarsdale. Sr. H.O. .. 43
Dorchester. Dorset County. H.O. .. 43
Huddersfield Royal Infy. Pre-reg. H.O. 43
Manchester R.H.B. Locum Cons. .. 39
Manchester R.H.B. Reg. 45
Mexborough. Montagu. Locum Sr. H.O. 45
Newcastle R.H.B. Locum P.-t. Cons. 39
Salisbury Gen. H.O. 46
Scotland. South-Eastern R.H.B. Reg. 47
Scotland. South-Eastern R.H.B. Sr. Reg. 47
Taplow. Canadian Red Cross Mem. H.O. 48

OPHTHALMOLOGY

London, E.1. P.-t. Sr. Reg.. .. 40
North West Met. R.H.B. Reg. .. 40
North West Met. R.H.B. P.-t. Cons. 38
St. Mary's, W.2. Sr. Reg. 40
Epping Group H.M.C. P.-t. Sr. H.M.O. 39
Scotland. Western R.H.B. Sr. Reg.. 47
Southampton Eye. Sr. H.O.. .. 47
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ORTHOPÆDICS

West London, W.6. Reg. 41
Beverley. Westwood. H.O. 41
Birmingham R.H.B. Regs.. 42
Bury St. Edmunds. West Suffolk Gen. Pre-reg. H.O. or Sr. H.O. .. 42
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Leeds R.H.B. Reg. 45
Leeds R.H.B. Locum Regs. 44
Manchester R.H.B. Reg. 45
Manchester R.H.B. Reg. 45
Newcastle R.H.B. Reg. 45
Newmarket Gen. Sr. H.O. 45
Northwood, Middx. Mount Vernon. Pre-reg. H.O. 46
Norwich. Norfolk & Norwich. Pre-reg. H.O. 45
Nottingham City & Nottingham Child's Hosps. Reg.. 45
Nottingham Gen. Sr. H.O. or Locum 45
Portsmouth Group H.M.C. Sr. H.O. & Pre-reg. H.O. 46
Romford. Oldchurch. H.O. 46
Southampton. Royal South Hants. H.O. 47
Stoke-on-Trent. Orthopædic. Sr. H.O. 47
Tunbridge Wells. Pembury. Sr. H.O. 48
Tunbridge Wells. Pembury. Pre-reg. H.O. 48
Winchester. Royal Hants County. Sr. H.O. 48

PÆDIATRICS

Bury St. Edmunds. West Suffolk Gen. H.O.'s. 42
Manchester R.H.B. & United Hosps. Sr. Reg. 45
Manchester United Hosps. Reg. .. 45
Salisbury Gen. H.O. 47
Sheffield United Hosps. Reg. or Sr. H.O. 46
Windsor. King Edward VII. Pre-reg. H.O. 48

PATHOLOGY

Guy's, S.E.1, & South-East Met. R.H.B. Sr. Reg. 40
Royal Free, W.C.1. H.O. 40
Woolwich Group H.M.C. Sr. H.O. .. 41
Birmingham R.H.B. Reg. 42
Nottingham Gen. Reg. 45
Scotland. Western R.H.B. Sr. Reg. 47
Shrewsbury. Royal Salop Infy./Copthorne. Sr. H.O. 47
U.S.A. Jewish Chronic Disease Hosp. Brooklyn, N.Y. Resident 48

PHYSICAL MEDICINE

Royal Northern, N.7. P.-t. Clin. Assts. (G.P.). 40
University College Hosp. & N.W. Met. R.H.B. Sr. Reg. 41

PLASTIC SURGERY

Scotland. Western R.H.B. Sr. Reg. 47
Dublin. St. Vincent's. Hon. Cons.. 39

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Canterbury. St. Martin's Mental. Jr. H.M.O. 43
Glasgow. Hawkhead (Mental). Sr. H.O. 43
Hornchurch. St. George's. Temp. Reg. 44
Isle of Man. Ballamona. Sr. H.O. .. 44
Leeds R.H.B. Regs. 38
Leeds R.H.B. Locum Regs. 44
Leicester. Carlton Hayes. Reg. .. 45
Nantwich. Barony. Jr. H.M.O. .. 45
Newcastle R.H.B. Sr. H.M.O. .. 39
Newcastle R.H.B. Cons. & Deputy Med. Supt. 39
North West Met. R.H.B. P.-t. Sr. H.M.O. 38
Scotland. Western R.H.B. Reg. .. 47
Scotland. Western R.H.B. Sr. H.M.O. 39
Sheffield United Hosps. Reg. .. 46
Sutton. Banstead. Jr. H.M.O. .. 47
Wakefield. Stanley Royd. Locum Jr. H.M.O. 48
Welsh R.H.B. Reg. 48
Welsh R.H.B. Cons./Med. Supt. .. 39
Winterton Mental. Jr. H.M.O. .. 48

RADIOLOGY

King's College Hosp., S.E.5, & South-East Met. R.H.B. Sr. Regs. .. 40
North West Met. R.H.B. P.-t. Cons. 38
St. George's, S.W.1. Reg. 40
Westminster, S.W.1. Sr. Reg. & Reg. 41
Birmingham & Sheffield R.H.B. Cons. 38
East Anglian R.H.B. Reg. 43
Liverpool R.H.B. Sr. H.M.O. .. 38
Scotland. South-Eastern R.H.B. Cons. 39
Scotland. Western R.H.B. Sr. H.M.O. 39
South Africa. Provincial Admin. of Cape of Good Hope. Med. Pract. (Grade D) 39

RADIOTHERAPY

Bebington. Clatterbridge. Jr. H.M.O. 41
Leeds United Hosps. Reg. 44
Northwood, Middx. Mount Vernon. H.O. 46

RHEUMATOLOGY

Leeds R.H.B. Reg. 44

SURGERY

Colindale, N.W.9. Sr. H.O. 39
Connaught, E.17. H.O.'s .. 39
Hosp. of St. John & St. Elizabeth, N.W.8. Reg. 40
Lambeth, S.E.11. H.O. 40
London, E.1. Reg. 40
Metropolitan, E.8. H.O. 40
Nelson, S.W.20. H.O. 40
Royal Marsden, S.W.3. H.O.'s .. 40
Royal Northern, N.7. H.O. 40
University College Hosp., W.C.1. Sr. Reg. 41
Willesden Gen., N.W.10. H.O. .. 41
Ashford, Middx. H.O. 41
Barnstaple. North Devon Infy. H.O. 41
Birmingham Accident. Sr. H.O. .. 41
Birmingham R.H.B. Reg. 42
Birmingham United Hosps. H.O.'s.. 42
Bishop Auckland Gen. H.O.. .. 41
Bridgend Gen. Sr. H.O. 42
Burton-on-Trent Gen. Locum Reg.. 42
Burton-on-Trent. Gen. Pre-reg. H.O. 42
Bury St. Edmunds. West Suffolk Gen. H.O.'s 42
Carshalton. Queen Mary's Hosp. for Child. H.O.. 43
Chelmsford & Essex. Pre-reg. H.O.. 43
Chichester. Royal West Sussex. H.O. 43
Enfield. Chase Farm. Pre-reg. H.O.. 43
Epsom Dist. Pre-reg. H.O. 43
Grantham & Kesteven Gen. Reg. .. 43
Haslemere & Dist. Sr. H.O. 43
Hertford County. Pre-reg. H.O. .. 44
Hounslow, Middx. H.O. 44
Huddersfield. Royal Infy. H.O. .. 44
Ilford. King George. Pre-reg. H.O.'s 44
Keighley & Dist. Victoria. H.O.'s .. 44
Kidderminster & Dist. Gen. Pre-reg. H.O. 44
Leamington Spa. Warneford Gen. H.O. 45
Leeds R.H.B. Locum Regs. 44
Leeds R.H.B. Regs. 45
Lincoln County. Pre-reg. H.O. .. 44
Manchester. Royal Manchester Child's. H.O. 45
Northwood, Middx. Mount Vernon. H.O. 46
Nottingham Child's. Sr. H.O. .. 46
Nottingham City. Sr. H.O. 46
Plymouth. South Devon & East Cornwall. Sr. H.O. & Pre-reg. H.O.'s 46
Poole Gen. Pre-reg. H.O.'s 46
Portsmouth Group H.M.C. Sr. H.O. 46
Reading. Battle. H.O. 46
Reading. Royal Berks. H.O. 46
Richmond, Surrey. Royal. Pre-reg. H.O. 46
Scotland. Western R.H.B. Reg. .. 47
Slough. Upton. Locum H.O. 47
Slough. Upton. Pre-reg. H.O. .. 47
Southampton. Royal South Hants. H.O. 47
Stockport Infy. Sr. H.O. 47
Stoke-on-Trent. City Gen. Pre-reg. H.O. 47
Stratford-on-Avon. H.O. 48
Taunton & Somerset. Pre-reg. H.O. 48
Torquay. Torbay. H.O. 48
Welsh R.H.B. Reg. & Locum Reg... 48
Welsh R.H.B. Locum Cons.. 39
Winchester. Royal Hants County. H.O. 48
Windsor. King Edward VII. Pre-reg. H.O. 48
Worcester Royal Infy. Sr. H.O. .. 48

THORACIC SURGERY

North Middlesex, N.18. Sr. H.O. .. 40

TROPICAL MEDICINE

University College Hosp., W.C.1. Reg. 41

UROLOGY

Leeds United Hosps. Reg. 44

GENERAL

Tottenham Group H.M.C. Hon. Clin. Assts. 41
Canada. Oshawa Gen., Ont. Intern.. 48
Canada. Reddy Mem., Westmount, Montreal. Sr. Internes 48
Michigan, U.S.A. Oakwood Hosp., Dearborn. Residency 48
U.S.A. Bethesda, Cincinnati. Rotating Interns 48

PUBLIC APPOINTMENTS 48

GENERAL PRACTICE 50

NON-MEDICAL 50

MISCELLANEOUS 50

The Terms and Conditions of Service of Hospital Medical and Dental Staff apply to all N.H.S. hospital posts we advertise, unless otherwise stated. Canvassing disqualifies, but candidates may normally visit the hospital by appointment.

Academic and Educational

ROYAL COLLEGE OF PHYSICIANS OF LONDON

The next EXAMINATION for the MEMBERSHIP will commence on MONDAY, 30TH DECEMBER, 1957.

Prospective candidates are asked to note that entries accompanied by the certificates, testimonials and the examination fee of 15 guineas as required by the Bye-Laws, must reach the College not later than first post on Monday, 2nd December, 1957. Candidates must have been qualified for 18 months.

Candidates who propose to submit published work under the regulations are required to give 28 days' notice, and should apply in writing to the Registrar, without delay, for detailed instructions as to the procedure they should follow. Completed entries for published work must also reach the College not later than first post on Monday, 2nd December, 1957.

HAROLD BOLDERO, D.M., Registrar.

12, Pall Mall East, London, S.W.1.

ROYAL COLLEGE OF PHYSICIANS OF LONDON

RONALD BODLEY SCOTT, D.M., F.R.C.P., will deliver the LANGDON-BROWN LECTURE on TUESDAY, 12TH NOVEMBER, 1957, at 5 P.M. at the College, Pall Mall East, London, S.W.1.

Subject: "The Chemotherapy of Malignant Disease."

Any member of the Medical Profession admitted on presentation of card.

By order of the President.

HAROLD BOLDERO, Registrar.

UNIVERSITY OF LONDON

A LECTURE entitled "Environmental Stress and Man's Health" will be delivered by Prof. T. F. HATCH (Pittsburgh) at 5.15 P.M. on 13TH NOVEMBER at the London School of Hygiene and Tropical Medicine, Keppel-street, Gower-street, W.C.1.

Admission free, without ticket.

JAMES HENDERSON, Academic Registrar.

UNIVERSITY OF LONDON

A LECTURE entitled "The Life History of Regional Ileitis" will be delivered by Dr. BURRILL B. CROHN (Columbia University) at 5 P.M. on 7TH NOVEMBER at St. Mary's Hospital Medical School (Wright-Fleming Institute Lecture Theatre), Norfolk-place, W.2.

Admission free, without ticket.

JAMES HENDERSON, Academic Registrar.

UNIVERSITY OF LONDON

(BRITISH POSTGRADUATE MEDICAL FEDERATION)
INSTITUTE OF NEUROLOGY
(Queen-square)

MUSCULAR DYSTROPHY RESEARCH FELLOWSHIP (MASON MEDICAL RESEARCH FUND)

Applications are invited from graduates in Medicine or Science for an appointment as RESEARCH FELLOW to work in the Department of Biochemistry on chemical problems in connection with muscular dystrophy using the techniques of chromatography and electrophoresis. The appointment will be for 1 year in the first instance and is renewable up to 3 years. The salary will be an amount not exceeding £1350 p.a., depending upon qualifications and experience.

Arrangements may be made to continue any existing superannuation contributions.

Applications, giving full particulars of qualifications and experience, should be made in writing to the Secretary, Institute of Neurology (Queen-square), The National Hospital, Queen-square, London, W.C.1, not later than 14 days from this notice.

UNIVERSITY COLLEGE LONDON

FREE PUBLIC LECTURES, AUTUMN TERM 1957

FRIDAY, 8TH NOVEMBER, at 5.30, Professor J. KONORSKI, "New Data concerning the Functions of the Prefrontal Areas in Animals."

MONDAY, 25TH NOVEMBER, 2ND and 9TH DECEMBER, at 5.00, Dr. H. HARRIS, "Human Biochemical Genetics."

Details of all public lectures (including lunch-hour lectures) from Publications Officer, University College, London, Gower-street, W.C.1. (Stamped envelope required.)

BRITISH POSTGRADUATE MEDICAL FEDERATION

(UNIVERSITY OF LONDON)
INSTITUTE OF ORTHOPÆDICS

COURSE ON DISORDERS OF JOINTS
14TH–16TH NOVEMBER, 1957

Thursday, 14th November, 1957—Town Section (234, Great Portland-street, W.1)

10.00–11.00 .. Manipulation .. Mr. H. JACKSON BURROWS
11.30–12.45 .. Rheumatoid Arthritis .. Dr. R. NASSIM
2.00–3.15 .. Radiology of Joint Disease .. Dr. R. O. MURRAY

Friday, 15th November, 1957—Town Section

10.00–11.00 .. Contractures .. Mr. J. I. P. JAMES
11.30–12.45 .. Clinical Demonstration .. Mr. A. T. FRIPP
2.00–3.00 .. Bacteriology in Joint Disease .. Dr. C. H. LACK
3.00–4.00 .. Ankylosing Spondylitis .. Prof. B. W. WINDEYER

Saturday, 16th November, 1957—Country Section (Brockley Hill, Stanmore, Middlesex)

9.30–11.00 .. General Ward Round .. Mr. K. I. NISSEN
11.30–12.30 .. Arthrodesis and Arthroplasty .. Mr. D. TREVOR
2.00–3.30 .. Joint Tuberculosis .. Mr. J. A. CHOLMELEY
4.00–5.00 .. Joint Tuberculosis .. Dr. F. H. STEVENSON

The fee for this course (including coffee, lunch and tea) is 3 guineas.

Early application should be made to the Dean, at 234, Great Portland-street, London, W.1.

BRITISH ASSOCIATION OF PHYSICAL MEDICINE

A WEEK-END COURSE designed primarily for those taking the Diploma in Physical Medicine will be held on 24th, 25th, and 26th January, 1958.

Further details can be obtained from the Honorary Secretary of the Association, 47, Lincoln's Inn-fields, London, W.C.2.

INSTITUTE OF ACCIDENT SURGERY

(In conjunction with the Board of Graduate Studies, The Medical School, University of Birmingham)

A COURSE in the ACUTE TREATMENT OF INJURIES, Birmingham Accident Hospital, 2nd–6th December, 1957.

PROGRAMME

Monday, 2nd December
2.00 P.M. .. Introduction .. .. Mr. WILLIAM GISSANE
3.00 P.M. .. Emergency treatment of major injuries .. Mr. F. G. BADGER

Tuesday, 3rd December
10.00 A.M. .. Principles of wound treatment .. .. Mr. P. S. LONDON
11.30 A.M. .. Transfusion in trauma Mr. RUSCOE CLARKE
2.00 P.M. .. Fractures of the upper limb .. .. .. Mr. F. G. BADGER
3.00 P.M. .. Fractures of the neck of the femur .. .. Mr. WILLIAM GISSANE
4.30 P.M. .. Demonstration—blood volume studies .. Dr. ELIZABETH TOPLEY

Wednesday, 4th December
9.30 A.M. .. Head injuries .. .. Mr. J. M. SMALL
11.00 A.M. .. Fractures of the femur and tibial condyles .. Mr. F. G. BADGER
12.15 P.M. .. Major injuries to joints Mr. H. PROCTOR
2.00 P.M. .. Hand injuries .. .. Mr. P. S. LONDON
3.00 P.M. .. Rehabilitation .. .. Mr. RUSCOE CLARKE

Thursday, 5th December
10.00 A.M. .. Chest injuries .. .. Mr. A. L. D'ABREU
11.30 A.M. .. Abdominal injuries .. Mr. RUSCOE CLARKE
2.00 P.M. .. Internal fixation of fractures .. .. .. Mr. J. H. HICKS
3.15 P.M. .. Fat embolism .. .. Dr. S. SEVITT
4.30 P.M. .. Tour of the hospital

Friday, 6th December
9.30 A.M. .. Peripheral nerve injuries Mr. ROBERT ROAF
11.00 A.M. .. Facial injuries .. .. Mr. RAINSFORD MOWLEM
2.00 P.M. .. Open fractures .. Mr. P. S. LONDON
3.00 P.M. .. Class conference

The fee for the Course (including lunch and tea) is 7 guineas, payable to the Institute of Accident Surgery.

Applications should be sent to and further particulars obtained from the Secretary, Institute of Accident Surgery, Birmingham Accident Hospital, Bath-row, Birmingham, 15.

NAPT SYMPOSIUM MEETINGS

LUNG CARCINOMA. Chairman: N. LLOYD RUSBY, M.A., D.M., F.R.C.P. FRIDAY, 22ND NOVEMBER.

CARDIAC PROBLEMS FOR GENERAL PHYSICIANS. Chairman: K. SHIRLEY SMITH, B.SC., M.D., F.R.C.P. FRIDAY, 6TH DECEMBER.

Both meetings 3.30–6.30 P.M. in Great Hall, B.M.A. House, W.C.1. Tickets, including afternoon tea and sherry, 10s. each.

Details from NAPT, Tavistock House North, W.C.1.

NAPT

SYMPOSIUM ON CHRONIC BRONCHITIS, Edinburgh. WEDNESDAY, 20TH NOVEMBER, 3.30–6.30 P.M. Adam House.

Details from NAPT, 65, Castle-street, Edinburgh.

Tickets, including afternoon tea and sherry, 10 shillings each.

THE NUFFIELD FOUNDATION

MEDICAL FELLOWSHIPS

As part of its programme for the advancement of health, the Nuffield Foundation is prepared to award a number of Fellowships to highly qualified men and women of the United Kingdom, usually between the ages of 25 and 35, who wish to train further for teaching and research appointments in any branch of medicine.

Applications for awards in 1958, which must first be endorsed by the executive authority of a university medical school in the United Kingdom, must be received by the Foundation not later than 1st February, 1958.

The conditions of these Fellowships and the application forms are obtainable from the Director, The Nuffield Foundation, Nuffield Lodge, Regent's Park, London, N.W.1.

L. FARRER-BROWN, Director of the Nuffield Foundation.

THE POST-GRADUATE COMMITTEE IN MEDICINE

THE UNIVERSITY OF SYDNEY

POST-GRADUATE TRAINING FELLOWSHIPS IN MEDICINE

Applications are invited from medical graduates for a Fellowship which may be held in any subject in the medical curriculum.

These training Fellowships have been established with the general object of advancing the art and science of medicine by means of postgraduate study, training and research and with the particular object of enabling graduates in medicine to obtain experience and training in medical research. They may be held wholly or partly in Australia or abroad, may include fellowships for primary research and of academic intent, fellowships for vocational study and training and fellowships for a combination of such purposes.

Appointment will be for 1 year but may be renewed for a second or third year. The salary will be up to £1200 for a single man and £1500 for a married man, which will include fares and allowances.

Applications will close on 1st January, 1958, and should be made to the Honorary Director, The Post-Graduate Committee in Medicine, 131, Macquarie-street, Sydney, to whom intending applicants must first communicate so that full particulars of the Fellowship and details of the method of application may be obtained.

GUY'S HOSPITAL MEDICAL SCHOOL, London, S.E.1. Applications are invited for the post of LECTURER IN PHARMACOLOGY with duties commencing as soon as possible, and at an initial salary of £1100–£100–£1600–£50 to £1650 p.a., plus £60 London allowance, with family allowance and superannuation.

Forms of application are obtainable from, and should be lodged with, the Dean, Guy's Hospital Medical School, London Bridge, S.E.1, not later than 7th November, 1957.

ST. THOMAS'S HOSPITAL MEDICAL SCHOOL. Applications are invited for the post of DEMONSTRATOR or JUNIOR LECTURER in the Department of Bacteriology. Previous experience desirable but not essential. Initial salary according to age and experience, in the range £650–£1100, with family allowance and participation in the F.S.S.U.

Further particulars may be obtained from Professor RONALD HARE, St. Thomas's Hospital Medical School, London, S.E.1.

UNIVERSITY OF EDINBURGH. Department of Pathology. Applications are invited for the post of LECTURER in the Department of Pathology. Salary scale £900–£100–£1900 p.a. (efficiency bar at £1300), with placement according to experience and qualifications, and with superannuation benefit and family allowance where applicable.

Further particulars may be obtained from the undersigned with whom applications, giving the names of 2 referees, should be lodged not later than 7th December, 1957.

CHARLES H. STEWART, Secretary to the University.

October, 1957.

THE UNIVERSITY OF LEEDS. Department of Anæsthetics. Applications are invited from registered medical practitioners for appointment as LECTURER IN ANÆSTHETICS at a salary on the scale £1200–£100–£1600 (efficiency bar)–£100–£1900 a year, according to qualifications and experience.

Applications (3 copies), stating date of birth, qualifications and experience, together with the names of 3 referees, should reach the Registrar, The University, Leeds, 2 (from whom further particulars may be obtained), not later than 25th November, 1957.

THE UNIVERSITY OF LEEDS. Department of Anæsthetics. Applications are invited from candidates interested in physiology, physics or biochemistry for appointment as Full-time RESEARCH ASSISTANT in the Department of Anæsthetics, at a salary within the range £500–£600 a year. The appointment is suitable for a science graduate intending to work for a higher degree and will be for 1 year in the first instance, subject to renewal. Laboratory facilities will be provided and the successful applicant will work as part of a group engaged in studying the problems of spontaneous and artificial respiration in man.

Applications (3 copies), stating date of birth, qualifications and experience, together with the names of 2 referees, should reach the Registrar, The University, Leeds, 2 (from whom further particulars may be obtained), not later than 25th November, 1957.

THE UNIVERSITY OF LIVERPOOL. Applications are invited for the post of LECTURER (part-time) in charge of the Department of Laryngology at a salary of £115 p.a. The Lecturer will be required to deliver a course of lectures in Otorhinolaryngology in the Medical School and to act as internal examiner in the final M.B. qualifying examination.

Applications, stating age, academic qualifications and experience, together with the names of 2 referees, should be received not later than 23rd November, 1957, by the Registrar, from whom further particulars of the conditions of appointment may be obtained.

THE UNIVERSITY OF MANCHESTER. Applications are invited from persons with medical qualifications registrable in this country for the full-time post of LECTURER or ASSISTANT LECTURER IN OPHTHALMIC PATHOLOGY in the Departments of Ophthalmology and Pathology. Whilst previous experience in the subject is desirable, candidates with some experience in general pathology would also be considered. The successful candidate would be required to commence his duties on 1st January, 1958, if possible. Salary p.a.: Lecturer, on a scale rising to £2150; Assistant Lecturer, on a scale £900–£1300. Initial salary and status according to qualifications and experience. Membership of the F.S.S.U. and children's allowance scheme.

Applications should be submitted not later than 20th November, 1957, to the Registrar, the University, Manchester, 13, from whom further particulars and forms of application may be obtained.

UNIVERSITY OF OXFORD. Applications are invited for the post of Whole-time FIRST ASSISTANT in the Nuffield Department of Anæsthetics, duties to commence early 1958. A particular interest in analgesia and anæsthesia in Obstetrics is desirable. The salary will be within the range £1900–£2500. The successful candidate will be granted an Honorary contract under the Board of Governors of the United Oxford Hospitals.

Applications (2 copies), together with the names of 3 referees, should be received not later than the end of November, 1957, by the Administrator, Radcliffe Infirmary, Oxford.

AUSTRALIA. UNIVERSITY OF SYDNEY. Applications are invited for the position of LECTURER/SENIOR LECTURER IN OBSTETRICS. Salary for a Lecturer is within the range £A1200–£A80–£A1750 p.a.; for a Senior Lecturer £A1800–£A70–£A2150 p.a. In each case cost-of-living adjustment will be allowed (£70 men, £53 women). The salary is subject to deductions under the State Superannuation Act. Commencing salary will be fixed according to the qualifications and experience of the successful applicant. Finance may be available for home purchase in approved cases to married male appointee.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36, Gordon-square, London, W.C.1. The closing date for the receipt of applications, in Australia and London, is 7th December, 1957.

MAKERERE COLLEGE. THE UNIVERSITY COLLEGE OF EAST AFRICA. Applications are invited for LECTURESHIP IN OBSTETRICS AND GYNÆCOLOGY. Salary scale £1446–£57–£1617–£60–£1737–£63–£1989 p.a. Allowance £50 p.a. per child (maximum £150 p.a.) F.S.S.U. Passages for appointee and family (up to 4 adult passages) on appointment, termination, and leave (3 months every 21 months). Rent according to quarters provided, £45–£84 p.a. (including basic furniture).

Detailed applications (6 copies), naming 3 referees, by 29th November, 1957, to Secretary, Inter-University Council for Higher Education Overseas, 29, Woburn-square, London, W.C.1, from whom further particulars may be obtained.

THE HOSPITAL FOR SICK CHILDREN—TORONTO, CANADA. HEAD OF VIRUS RESEARCH DEPARTMENT required to direct Virus Laboratory; duties to include Research and Routine Investigation of Virus Infections. Teaching responsibilities may be arranged. Vacant 1st April, 1958. Salary $9000–$10,000 p.a., depending on qualifications.

Applications, stating, age, qualifications and experience, should be sent via air mail to The Director, The Research Institute, The Hospital For Sick Children, 555, University-avenue, Toronto.

Hospital Services: Senior Appointments

GUY'S HOSPITAL. The Board of Governors invite applications for the appointment of CONSULTANT DENTAL SURGEON for attendance on 1 session at Guy's Hospital and 1 session at the Evelina Hospital per week. The appointment is of Consultant status and applicants should hold a registrable dental qualification and an additional higher qualification. The conditions of service will be in accordance with the terms and conditions of service of hospital dental staff.

Applications (1 copy), together with the names of 3 referees, should be lodged with the Superintendent, Guy's Hospital, London Bridge, S.E.1, not later than 2nd December, 1957. In accordance with Statutory Instrument No. 1259 of the National Health Service Regulations, canvassing members of the Board or Advisory Appointments Committee will lead to disqualification.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

1. CONSULTANT RADIOLOGIST, 2 half-days a week, Hornsey Central Hospital, Park-road, N.8. (General Practitioner Hospital—60 Beds.)

Applications before 25th November, 1957.

2. CONSULTANT OPHTHALMOLOGIST, 1 half-day a week (Tuesday afternoons). Royal London Homœopathic Hospital, Great Ormond Street, W.C.1. (183 Beds.)

Applications before 27th November, 1957.

3. CONSULTANT GERIATRICIAN, whole-time, West Herts Group of Hospitals. Duties mainly at Shrodells Hospital, Watford (386 Beds) and St. Paul's Hospital, Hemel Hempstead (221 Beds).

Applications before 29th November, 1957.

Hospitals may be visited by direct appointment.

4. ASSISTANT CHILD PSYCHIATRIST, Senior Hospital Medical Officer grade, 6 half-days a week, Hertfordshire Child Guidance Service. Applications will be considered for 6, 4, or 2 half-days a week and candidates should state for which they are applying. Clinic may be visited by appointment with Medical Director, Child Guidance Clinic, Hill End, St. Albans.

Applications before 6th December, 1957.

Application forms obtainable from and returnable to Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1.

BIRMINGHAM AND SHEFFIELD REGIONAL HOSPITAL BOARDS. Joint appointment of Whole-time CONSULTANT RADIOLOGIST. Duties at Burton-on-Trent General and Outwoods Hospitals (340 Beds—6 notional half-days) and at the Derby Group of hospitals (5 notional half-days). Wide experience specialty/higher qualification required.

Applications (15 copies), stating name, age, qualifications, nationality, present and previous appointments and details of 3 referees, to Secretary, 10, Augustus-road, Birmingham, 15, by 2nd December, 1957.

LEEDS REGIONAL HOSPITAL BOARD. Applications are invited from medical practitioners for the appointment of REGIONAL PSYCHIATRIST. The person appointed will be employed for 7/11ths of his time on administrative duties concerned with the development of the Mental Health Service in the Region and will be on the staff of the Senior Administrative Medical Officer at the Board's Headquarters, Harrogate. (Salary scale, whole-time, £2300–£2875 p.a.). For the remaining 4/11ths of his time he will be engaged on Consultant clinical work (salary scale, whole-time, £2205–£3255 p.a.). The proportion of time spent on administrative and clinical duties will be subject to review from time to time. It is hoped that arrangements will be made for the successful candidate to work in association with the Leeds University Department of Psychiatry for at least 1 session per week. Candidates should hold high qualifications in medicine and psychiatry and have wide experience in general psychiatry, including administrative experience of both inpatient and outpatient work.

Applications (12 copies), with full details of qualifications and experience, together with the names of 3 referees, to be sent to the Secretary, Park-parade, Harrogate, by 18th November, 1957.

LIVERPOOL REGIONAL HOSPITAL BOARD. South LIVERPOOL GROUP. Applications are invited for the post of whole-time ASSISTANT RADIOLOGIST (Senior Hospital Medical Officer) with duties in the above group but mainly at Sefton General Hospital (516 Beds). Applicants should possess a Diploma in Radiology and have wide experience in radiology.

Forms of application from Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be returned not later than 23rd November, 1957.

VINCENT COLLINGE, Secretary to the Board.

EPPING GROUP HOSPITAL MANAGEMENT COMMITTEE. OPHTHALMOLOGIST required for children's refraction clinics at Ongar, Essex (1 session monthly) and at Epping, Essex (2 sessions monthly), Senior Hospital Medical Officer grade.

Further information can be obtained from the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex, to whom application should be made as soon as possible.

MANCHESTER REGIONAL HOSPITAL BOARD. Locum CONSULTANT OBSTETRICIAN GYNÆCOLOGIST. Whole-time or maximum part-time. Salary grading according to individual status.

Apply immediately to the Group Secretary, Bolton and District Hospital Management Committee, The Royal Infirmary, Bolton, from whom any further information can be obtained.

NEWCASTLE REGIONAL HOSPITAL BOARD. Assistant PSYCHIATRIST (Senior Hospital Medical Officer), whole-time, for the recently opened Department of Child Psychiatry attached to the Newcastle General Hospital which is associated with University Department of Psychological Medicine under the general direction of the Professor of Psychiatry. The Unit, which is the training centre in Child Psychiatry in the region and undertakes undergraduate and postgraduate teaching as well as research, cooperates with Department of Pædiatrics. Applicants should possess Diploma in Psychological Medicine and a higher medical degree would be an advantage. Further particulars from Regional Psychiatrist.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 28 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. Consultant PSYCHIATRIST AND DEPUTY MEDICAL SUPERINTENDENT, St. Mary's Hospital, Stannington, near Morpeth (856 Beds). The Hospital and admission unit were opened in 1913 and 2 convalescent and 2 parole villas added in 1939. It serves Gateshead County Borough and parts of the Counties of Northumberland and Durham (population 304,610). Outpatient clinics held at Queen Elizabeth Hospital, Gateshead; St. Thomas Clinic, Newcastle, and General Hospital, Hexham. Applicants should have had wide experience in intra- and extra-mural psychiatry and be prepared to take clinical charge, subject to general administrative control of Medical Superintendent, of a section of the hospital and to participate in the work of associated outpatient clinics and domiciliary consultant service in the area served by the Hospital. The post is whole-time resident. A suitable house is available. Candidates may visit the Hospital by arrangement with the Medical Superintendent.

Applications, together with names and addresses of 3 referees, to Regional Psychiatrist, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 28 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. Locum CONSULTANT OBSTETRICIAN AND GYNÆCOLOGIST for 9 notional half-days per week for Tees-side Group of hospitals for approximately 3 months.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Newcastle Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, immediately.

SHEFFIELD REGIONAL HOSPITAL BOARD. Maximum Part-time CONSULTANT E.N.T. SURGEON required with duties mainly at the Chesterfield Royal Hospital.

Application form and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 23rd November, 1957.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT SENIOR CASUALTY OFFICER required at the Rotherham Hospital, Doncaster Gate, Rotherham. Salary scale £1653 15s.–£52 10s.–£2126 5s. p.a. Tenure for a period not exceeding 4 years.

Application form and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 23rd November, 1957.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD. Applications are invited for a whole-time post of SENIOR HOSPITAL MEDICAL OFFICER in Anæsthetics at the Stornoway Hospitals. Duties are mainly at the Lewis Hospital, where a rented house is available for the officer.

Schedules of application and further particulars are obtainable from the undersigned, with whom applications should be lodged by 30th November, 1957.

A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.
Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment as HEAD OF THE DEPARTMENT OF RADIODIAGNOSIS, Royal Infirmary, Edinburgh (Consultant, whole or maximum part-time). The person appointed will be expected to take part in undergraduate and postgraduate teaching.

Apply, giving particulars of age, qualifications and previous experience, and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, within 30 days.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments :—

Whole-time ASSISTANT PHYSICIAN in Chest Diseases at Ruchill Hospital, Glasgow. Salary (at age 32 and over) on the scale £1653 15s.–£52 10s.–£2126 5s.

Whole-time ASSISTANT RADIOLOGIST based at the Dumfries and Galloway Royal Infirmary, Dumfries. Salary (at age 32 and over) on the scale £1653 15s.–£52 10s.–£2126 5s.

Applications (16 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, not later than 30 days after the publication of this advertisement.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments :—

Whole-time ASSISTANT PSYCHIATRIST at Stobhill General Hospital, Glasgow. Salary (at age 32 and over) on the scale £1653 15s.–£52 10s.–£2126 5s.

Whole-time SENIOR HOSPITAL MEDICAL OFFICER in Geriatrics at Cleland Hospital, Lanarkshire. Salary (at age 32 and over) on the scale £1653 15s.–£52 10s.–£2126 5s.

Applications (16 copies), stating date of birth, qualifications, experience, present appointments, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, not later than 30 days after the publication of this advertisement.

WELSH REGIONAL HOSPITAL BOARD. Whole-time CONSULTANT PSYCHIATRIST/MEDICAL SUPERINTENDENT required Cefn Coed Hospital, near Swansea (710 Beds). Applicants should have had wide experience in psychiatry and hold a diploma in psychological medicine. Successful candidate will be required to reside in house situated in the hospital grounds.

Applications (12 copies), naming 3 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 21 days.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens CONSULTANT SURGEON required, as soon as possible, for 2 weeks, Royal Alexandra Hospital, Rhyl.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

DUBLIN. ST. VINCENT'S HOSPITAL. Applications for the position of HONORARY CONSULTANT PLASTIC SURGEON should be received on or before 15th November, 1957.

For further information apply to the undersigned.

OLIVER FITZGERALD, Honorary Secretary Medical Board.

SOUTH AFRICA. PROVINCIAL ADMINISTRATION OF THE CAPE OF GOOD HOPE. UNIVERSITY OF CAPE TOWN. Joint Medical Staff for Groote Schuur and other teaching Hospitals. Vacancy. Applications are invited from suitably qualified persons for appointment to the following vacant post at the Groote Schuur Hospital, Observatory, Cape Town :—

Department of Radio-diagnosis

MEDICAL PRACTITIONER (grade D) with salary at the rate of £1740 p.a. (fixed).

In addition to the basic salary, a non-pensionable cost-of-living allowance at rates prescribed from time to time by the Administrator (at present amounting to £234 p.a.) is payable to certain whole-time married officials and employees.

The conditions of service are governed by the relevant Ordinances and Regulations as well as the agreement entered into between the Cape Provincial Administration and the University of Cape Town.

The joint medical staff is required to serve jointly the Provincial administration and the University of Cape Town.

Candidates must be registered Specialists or must be in possession of appropriate postgraduate diplomas or degrees in Radiodiagnosis, and are requested to furnish particulars in regard to the following :—

(*a*) Academic achievements (degrees and diplomas held and the standard of achievement in professional examinations, scholarships and special awards).

(*b*) Professional experience (not only the name of the employer but also that of the institution in which the candidate worked and the type of work undertaken).

(*c*) Names of 3 references (1 of these should preferably be someone occupied in the same branch of medicine as the candidate), who should be asked by the candidate to submit confidential reports to the Director of Hospital Services before the closing date for the receipt of applications.

Applications must be made in duplicate on the prescribed form, Staff 23, which is obtainable from the office of the Immigration Attache for the Union of South Africa, South Africa House, Trafalgar-square, London, W.C.2. Details as regards conditions of service and transport facilities can also be obtained at the office of the abovementioned.

The completed application forms must be addressed to the Director of Hospital Services P.O. Box 2060, Cape Town, South Africa and must reach him not later than the 30th November, 1957.

Candidates must state the earliest date on which they can assume duty.

U.S.A., BROOKLYN, NEW YORK. Anesthesiologists. 2 openings on the Professional Staff of a 400-Bed Hospital, 20 minutes from Times Square. Active anesthesia experience in wide variety anesthesia techniques, including cardio-pulmonary. New operating room, air-conditioned suite. This Hospital affiliated with New York State University Medical School.

Applications, stating age, nationality, qualifications and previous experience. 2 references requested. Send applications to Director of Anesthesiology, Address No. 334, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Hospital Services: Junior Appointments

COLINDALE HOSPITAL, Colindale-avenue, London, N.W.9. (300 Beds.) SENIOR HOUSE OFFICER, resident or non-resident, required at above Hospital to assist in thoracic, orthopædic, and genito-urinary surgery.

Apply, stating age, qualifications and experience and giving the names and addresses of 2 referees, to Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, by 16th November, 1957.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (123 Beds). 2 HOUSE SURGEONS required for 6 months. Recognised for F.R.C.S.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

GUY'S HOSPITAL, S.E.1, and SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in Clinical Pathology to the Board of Governors of Guy's Hospital and the South East Metropolitan Regional Hospital Board, with duties until 30th September, 1960. The appointment will be made jointly by the bodies concerned and will be held in the first instance in the Lewisham Group until 30th September, 1959, and at Guy's Hospital from 1st October, 1959, until 30th September, 1960. The post, which will be reviewed annually, is subject to the terms and conditions of service of hospital medical and dental staff (England and Wales).

Forms of application are obtainable from, and should be lodged with, the Superintendent, Guy's Hospital, London Bridge, S.E.1, not later than 16th November, 1957.

HIGHLANDS GENERAL HOSPITAL, Winchmore Hill, N.21. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR required at above Hospital. Vacant 23rd January, for Chest Unit linked with Chest Clinic. Experience in general medicine essential and experience in chest diseases desirable. Resident or non-resident. If non-resident required to sleep in on nights on duty. Hospital may be visited by direct appointment.

Application forms obtainable from and returnable to Secretary, Northern Group Hospital Management Committee, Royal Northern Hospital, Holloway, N.7, by 12th November.

HOSPITAL OF ST. JOHN AND ST. ELIZABETH, 60, Grove End-road, London, N.W.8. Required to commence on Monday, 2nd December, Full-time SURGICAL REGISTRAR (Male). The possession of the Diploma of one of the Royal Colleges is desirable. Honorarium at the rate of £850 p.a. Appointment will be for a period of 12 months.

Further particulars may be obtained from the Secretary to whom applications, with names of 3 referees, should be sent on or before Tuesday, 5th November.

HOSPITAL OF ST. JOHN AND ST. ELIZABETH, 60, Grove End-road, London, N.W.8. Applications are invited from preregistration or registered medical practitioners (Male) for the appointment of HOUSE SURGEON to the Midwifery and Gynæcological Departments, to become vacant on 4th December, 1957. Appointment will be for a period of 6 months. National Health Service salary.

Applications to reach the Secretary on or before 4th November, 1957, together with copies of 3 recent testimonials.

KING'S COLLEGE HOSPITAL BOARD OF GOVERNORS, S.E.5, and THE SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of 2 SENIOR REGISTRARS in Radiology (diagnostic), to be made jointly by the bodies concerned, the posts to be held at King's College Hospital and in the Woolwich Hospital Group. Applicants should hold a Diploma in Radiology. Preference will be given to those possessing a higher qualification in Medicine or Radiology. The successful candidates will be expected to spend part of their time in the Regional Board Hospital on an exchange basis. The appointments, which are tenable from the 1st October, 1957, for a 4-year period, renewable annually, to be filled as soon as possible.

Applications, stating age, education and qualifications and experience, and giving the names of 2 referees, should be sent to the undersigned not later than 16th November, 1957.

S. W. BARNES, House Governor.

LAMBETH HOSPITAL, Brook-drive, S.E.11. Applications are invited from pre-registration and registered medical practitioners for the post of RESIDENT HOUSE SURGEON. Vacant 5th December, 1957. The successful candidate will be required to carry out a fortnight's locum duty from 21st November, 1957.

Application forms from the Secretary.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for a Part-time SENIOR REGISTRAR to the Ophthalmic Department Candidates must be Fellows of the Royal College of Surgeons. The successful candidate will be required to attend on 3 half-days a week.

Applications (12 copies), giving the names and addresses of 3 referees, should be received by the undersigned by 12th November, 1957. H. BRIERLEY, House Governor.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for the post of REGISTRAR in General Surgery becoming vacant on 1st January, 1958. A higher qualification, although desirable, is not essential. The appointment will be for 1 year, renewable for a further year, 1 of which will be spent in the Department of Thoracic Surgery or at the Hospital's Annexe at Brentwood.

Applications (12 copies), giving the names and addresses of 3 referees, should be received by the undersigned by 12th November, 1957. H. BRIERLEY, House Governor.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. SENIOR HOUSE OFFICER for Thoracic Surgical Unit, resident, required. 6 months' appointment in the first instance, from 17th December (locum 2nd–16th December). The post, which is recognised for F.R.C.S., offers experience in all types of tuberculous and non-tuberculous thoracic surgery.

Applications, stating age, nationality, qualifications, experience, with copies of recent testimonials and/or names of 2 referees, to Secretary of Hospital, by 6th November.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. OPHTHALMIC REGISTRAR (whole-time and non-resident) required for Group Ophthalmic Centre of 26 Beds, now being constructed at Neasden Hospital, Brentfield-road, N.W.10. Possibility of attending outpatient clinics in Group hospitals. Selected candidate must be prepared to live within reasonable access to the Hospital. Appointment to commence approximately 1st February, 1958. Hospital may be visited by direct appointment.

Application forms obtainable from and returnable to Group Secretary, Central Middlesex Group Hospital Management Committee, Acton-lane, N.W.10, by 13th November, 1957.

METROPOLITAN HOSPITAL, Kingsland-road, London, E.8. (General—146 Beds.) Applications are invited for the post of HOUSE SURGEON, from provisionally, or full registered, candidates, stating age, nationality, qualifications and experience, together with copies of 3 testimonials, to the Hospital Secretary.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. HOUSE SURGEON (resident) (not pre-registration). Post vacant 8th December. Recognised for F.R.C.S.

Applications, stating age, qualifications, &c., with the names and addresses of 2 referees, should be sent to the Secretary at above address.

ROYAL FREE HOSPITAL. Applications are invited for the post of RESIDENT PATHOLOGIST (House Officer), vacant 1st December, 1957, from registered Men and Women practitioners. The post is for 6 months, renewable for a further 6 months. Salary and conditions of service in accordance with the scale laid down by the Ministry of Health for House Officers.

Applications, with names of 2 referees, should be submitted to the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, W.C.1, as soon as possible.

ROYAL MARSDEN HOSPITAL, Fulham-road, London, S.W.3. Applications are invited from registered medical practitioners for 2 posts of HOUSE SURGEON (resident). Salary £577 10s. p.a. Posts are tenable for 6 months from 13th and 31st December respectively.

Forms of application are obtainable from the House Governor, to whom applications, together with copies of 3 recent testimonials, should be sent before 11th November.

ROYAL NATIONAL THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C.1, and Golden-square, W.1. There will be a vacancy on 1st December, 1957, for an ANÆSTHETIC REGISTRAR (resident or non-resident) to work as required at both hospitals. Applicants should have had some special experience in anæsthesia and preferably should hold, or be working for a higher qualification in that specialty. Registrar grading, and salary in accordance with the terms and conditions of service under the National Health Service Act.

Applications, giving full particulars of age, qualifications and experience, with the names of 2 referees, should be sent to the House Governor within 10 days.

ROYAL NORTHERN HOSPITAL, Holloway, N.7. (279 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. MEDICAL REGISTRAR (second) required at the above Hospital. Candidates may visit the Hospital by direct appointment.

Application forms obtainable from and returnable to the Secretary, Royal Northern Hospital, N.7, by 12th November, 1957.

ROYAL NORTHERN HOSPITAL, Holloway, N.7. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer grade), with duties in the E.N.T. Department, vacant end of November, 1957. Recognised for F.R.C.S.

Applications to be sent to the Hospital Secretary by 12th November, 1957.

ROYAL NORTHERN HOSPITAL, Holloway, N.7. Applications are invited for the post of HOUSE SURGEON, vacant 16th December, 1957. Preference given to pre-registration candidates. Recognised for F.R.C.S.

Applications, with copies of recent testimonials, to be sent to the Hospital Secretary by 13th November, 1957.

ROYAL NORTHERN HOSPITAL, Holloway-road, London, N.7. CLINICAL ASSISTANTS (2) required for Department of Physical Medicine. One 1 session per week and the other 3 sessions per week. General practitioner grade.

Application forms and further particulars from Hospital Secretary.

ST. FRANCIS' HOSPITAL, Constance-road, East Dulwich, S.E.22. Applications invited for appointment as SENIOR HOUSE OFFICER (general medical duties). Unit under direction of full-time geriatrician; associated with a "half-way" house; follow-up and pre-admission outpatient clinics; facilities for investigations. Vacant from 25th November, 1957. Salary £819 10s. a year, less £150 residential charge.

Applications, giving age, qualifications and details of previous posts, to Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital, East Dulwich-grove, S.E.22, not later than 14th November.

ST. GEORGE'S HOSPITAL, S.W.1. Applications are invited for the whole-time post of REGISTRAR to the Diagnostic X-ray Department of the St. George's Hospital Group. Special facilities will be available for research work, and for those wishing to take higher qualifications. Candidates should possess a Diploma in Radiology. The post is non-resident.

Applications, stating age, education, qualifications and experience, together with the names of 2 referees, should reach the undersigned not later than 16th November, 1957.

P. H. CONSTABLE, House Governor.

ST. MARY ABBOTS HOSPITAL, Marloes-road, Kensington, W.8. Applications are invited for appointment as REGISTRAR in Anæsthetics. Post recognised for the F.F.A.R.C.S. and the D.A. Resident on nights on duty. Candidates may visit the Hospital by arrangement.

Applications (5 copies) to be submitted by 15th November, 1957, on forms obtainable from, and returnable to, Group Secretary, 5, Collingham-gardens, London, S.W.5. (L103.)

ST. MARY'S HOSPITAL, W.2. Ophthalmic Department. WESTERN OPHTHALMIC HOSPITAL, Marylebone-road, N.W.1. SENIOR REGISTRAR (whole-time, non-resident) required, duties to commence 1st February, 1958, or as soon as possible thereafter. Candidates must have postgraduate experience and should hold, or be studying for, the F.R.C.S.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, should reach ALAN POWDITCH, House Governor, St. Mary's Hospital, not later than 23rd November, 1957.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited from suitably qualified general medical practitioners for appointment as Part-time MEDICAL OUTPATIENT ASSISTANTS in the following vacancies, with effect from 1st January, 1958:—

Monday mornings
Tuesday mornings
Tuesday afternoons
Friday mornings

The appointments are for a first period of 12 months; remuneration to be at the rate of £183 15s. p.a., i.e. graded "General Practitioner."

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, by 20th November, 1957.

TOTTENHAM GROUP HOSPITAL MANAGEMENT COMMITTEE, The Green, N.15. Applications are invited from registered medical practitioners for appointment as HONORARY CLINICAL ASSISTANTS to all Medical, Surgical and other Special Outpatient Departments of The Prince of Wales's General Hospital and the Obstetric Department at Bearsted Memorial Hospital, for a period of 1 year commencing 1st January, 1958.

Applications to Group Secretary, stating qualifications and experience, &c., by 9th November, 1957.

TOTTENHAM GROUP HOSPITAL MANAGEMENT COMMITTEE, The Green, N.15. Applications are invited for the appointment of RESIDENT HOUSE PHYSICIAN (third post) for duties at The Prince of Wales's General Hospital and St. Ann's General Hospital, for a period of 6 months from 1st December, 1957.

Application form from Secretary to be returned by 16th November, 1957.

UNIVERSITY COLLEGE HOSPITAL, Gower-street, W.C.1. RESIDENT MEDICAL OFFICER (Registrar) required at the Hospital for Tropical Diseases, 4, St. Pancras-way, N.W.1, from 1st January, 1958. Appointment for 6 months, renewable.

Applications, with names of 2 referees, to Administrator and Secretary, University College Hospital, by 12th November, 1957.

UNIVERSITY COLLEGE HOSPITAL, Gower-street, W.C.1. Applications are invited for the post of RESIDENT ASSISTANT SURGEON (graded Senior Registrar) for 1 year in the first instance from a date to be arranged. The successful candidate may be permitted to be non-resident.

Applications, with names of 2 referees, to Administrator and Secretary by 16th November, 1957.

UNIVERSITY COLLEGE HOSPITAL AND THE NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time SENIOR REGISTRAR in Physical Medicine required for 1 year in the first instance from a date to be arranged. The duties will involve attendance at University College Hospital (6 half-days a week) and at the Medical Rehabilitation Centre, Camden-road, N.W.1 (5 half-days a week).

Applications, with the names of 3 referees, to Administrator and Secretary, University College Hospital, Gower-street, W.C.1, by 16th November, 1957.

WEST LONDON HOSPITAL, Hammersmith-road, London, W.6. Whole-time NON-RESIDENT REGISTRAR (orthopædics) required. Post vacant 2nd December.

Applications, stating age, qualifications, experience, names 2 referees, to Secretary, Board of Governors, Hammersmith, West London and St. Mark's Hospitals, Ducane-road, London, W.12, by 11th November.

WESTMINSTER HOSPITAL, St. John's-gardens, S.W.1. Applications invited for post of SENIOR REGISTRAR to Radiological (diagnostic) Department for 1 year in first instance. Post now vacant.

Applications (12 copies), with names of 2 referees, to House Governor by 16th November.

WESTMINSTER HOSPITAL, St. John's-gardens, S.W.1. Applications invited for post of REGISTRAR to Radiological (diagnostic) Department for 1 year in first instance from 12th December, 1957.

Applications (8 copies), with names of 2 referees, to House Governor by 16th November.

WILLESDEN GENERAL HOSPITAL, Harlesden-road, N.W.10. RESIDENT HOUSE SURGEON wanted 1st December. Pre-registration candidates eligible.

Applications, with full particulars and names of 2 referees, to Hospital Secretary by 13th November.

WOOLWICH GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pathology). Vacant 1st January. The appointment is to the Group laboratories and is for 1 year. Salary £819 10s. p.a., less £150 p.a. if resident.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

ASHTON, HYDE AND GLOSSOP HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER (resident) required for Casualty Department, Ashton-under-Lyne General Hospital. Appointment limited to 4 years. Minimum commencing salary £852 10s. p.a., but higher salary may be paid according to experience and qualifications. There may be some orthopædic duties to be undertaken by the holder of this post.

Apply, giving age, experience, qualifications and names of 2 referees, to Group Secretary, General Hospital, Ashton-under-Lyne.

ASHFORD HOSPITAL, Ashford, Middlesex. (560 Beds.) STAINES GROUP HOSPITAL MANAGEMENT COMMITTEE. RESIDENT HOUSE SURGEON for general surgical duties. 6 months' appointment, suitable for pre-registration candidates. Post vacant 27th November, 1957.

Applications, stating age, qualifications and experience, with copies of up to 3 recent testimonials, to Medical Director of Hospital immediately.

ASHFORD HOSPITAL, Ashford, Middlesex. (560 Beds.) STAINES GROUP HOSPITAL MANAGEMENT COMMITTEE. RESIDENT HOUSE OFFICER for Special Departments (E.N.T., Paediatric, Dermatology, &c.). 6 months' appointment, vacant 6th November, 1957. Not suitable for pre-registration candidates; offers good experience before general practice.

Applications, stating age, qualifications and experience, with copies of up to 3 recent testimonials, to Medical Director of Hospital immediately.

BARNSTAPLE. NORTH DEVON INFIRMARY. (105 Beds.) HOUSE SURGEON (pre-registration); vacant now. The Hospital serves a wide area of pleasant countryside and the post affords good opportunity to study excellent clinical material.

Apply to Group Secretary, 19, Alexandra-road, Barnstaple.

BASINGSTOKE, HAMPSHIRE. PARK PREWETT AND PINEWOOD HOSPITALS. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of SENIOR PSYCHIATRIC REGISTRAR. Candidates should possess the D.P.M. and have had considerable experience in psychiatry. Residential accommodation is available to a single person.

Application forms can be obtained from the Group Secretary, Park Prewett Hospital, and should be returned not later than 14 days after the appearance of this advertisement. Applicants may visit the Hospital by appointment.

BASINGSTOKE, HAMPSHIRE. PARK PREWETT AND PINEWOOD HOSPITALS. Applications are invited for the appointment of PSYCHIATRIC REGISTRAR which will be vacant in early January, 1958. The admission rate is nearly 1500 annually and over one third are informal. All modern treatments are used and opportunity will be given for varied experience in all branches of psychiatry. The Hospital is recognised by the London University and Royal Colleges for the D.P.M. Salary and conditions of service in accordance with National scales. Residential accommodation is available to a single person.

Applications, with full particulars and names and addresses of 2 referees, should be sent to the Group Secretary, Park Prewett Hospital, Basingstoke, as soon as possible.

BEBINGTON, CHESHIRE. CLATTERBRIDGE HOSPITAL WEST. CENTRAL WIRRAL GROUP. Applications are invited for the resident post of JUNIOR HOUSE MEDICAL OFFICER in the 63-Bed Radiotherapy Wing of the above Hospital. Supervoltage equipment will be used and valuable experience will be obtainable for those contemplating specialising in Radiotherapy. Whitley Council conditions of service—Salary £852 10s. to £1182 10s.

Apply on form from Secretary by 16th November, 1957.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) HOUSE PHYSICIAN (House Officer or Senior House Officer grading according to experience).

Apply Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL (229 acute beds.) ORTHOPÆDIC HOUSE SURGEON (first, second or third post), vacant now. Offers good opportunity for general experience in busy acute general hospital. Approved pre-registration post. Fully registered practitioners may apply. Recognised for F.R.C.S.

Apply Group Secretary.

BISHOP AUCKLAND. THE GENERAL HOSPITAL SENIOR HOUSE OFFICER or JUNIOR HOSPITAL MEDICAL OFFICER (anæsthetist) required at above hospital. Grading according to qualifications and/or experience.

Applications, including names of 3 referees, to Group Secretary, South West Durham Hospital Management Committee, at once.

BISHOP AUCKLAND, co. DURHAM. THE GENERAL HOSPITAL (350 Beds.) HOUSE SURGEON required. Recognised pre-registration appointment. Accommodation available for married officer with no children.

Apply, naming 2 referees, to K. G. T. LUXFORD, Group Secretary, South West Durham Hospital Management Committee, at the above address.

BIRMINGHAM ACCIDENT HOSPITAL AND REHABILITATION CENTRE, Bath-row, BIRMINGHAM, 15. SENIOR HOUSE SURGEON. Applications are invited for post now vacant. Hospital is largest traumatic unit in the country and treated 53,000 new patients last year, including 2000 thermal injuries. Post offers ample opportunity for practical experience in management of all types of injury—orthopædic, thoracic, abdominal and neurosurgical cases. Hospital is recognised for casualty training by Royal College of Surgeons.

Applications, with details naming 2 referees, to Administrator.

BIRMINGHAM GROUP 9 HOSPITAL MANAGEMENT COMMITTEE. (Mental Deficiency.) Locum JUNIOR HOSPITAL MEDICAL OFFICER required immediately.

Apply to Secretary, Coleshill Hall Hospital, Coleshill, near Birmingham.

BIRMINGHAM (near). MIDLAND CENTRE FOR NEUROSURGERY, Holly-lane, Smethwick, near BIRMINGHAM. RESIDENT SENIOR HOUSE OFFICER, vacant 14th December, 1957. This is a new hospital entirely devoted to neurology and neurosurgery, within easy reach of Birmingham. Salary on national scale less deduction for board, lodging, &c.

Applications, with names of 2 referees, to the Group Secretary, West Bromwich and District Hospitals Management Committee.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS Applications are invited for the post of RESIDENT OBSTETRIC AND GYNÆCOLOGICAL REGISTRAR for duties at the Queen Elizabeth Hospital and The Birmingham and Midland Hospital for Women (Professorial Unit) to commence duty at the earliest possible moment.

Forms of application with details of appointment may be obtained from, and should be returned not later than 14th November, 1957, to the House Governor, Birmingham and Midland Hospitals for Women, Showell Green-lane, Birmingham 11. G. A. PHALP, Secretary.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE CHILDREN'S HOSPITAL Ladywood-road, BIRMINGHAM 16. HOUSE OFFICERS (surgical) required to commence duty on 7th January, 1958, for 6 months. The posts rotate during the period giving good experience of general and special surgery. Recognised for pre-registration students, but registered practitioners may apply.

Forms of application available from the House Governor, and should be returned to him by 16th November, 1957.

G. A. PHALP, Secretary to the Board of Governors.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE BIRMINGHAM AND MIDLAND HOSPITALS FOR WOMEN (incorporating the Hospital for Women and the Birmingham Maternity Hospital), Showell Green-lane, SPARKHILL, BIRMINGHAM, 11. Applications are invited for the post of RESIDENT OBSTETRICAL AND GYNÆCOLOGICAL REGISTRAR, vacant immediately. The successful candidate will be required to alternate duty at the Hospital for Women and the Maternity Hospital, for specific periods. The post is recognised for the M.R.C.O.G., and applicants should have held House appointments and at least one obstetrical and gynæcological post.

Forms of application may be obtained from, and should be returned not later than 21st November, 1957, to, the House Governor at the above address. G. A. PHALP, Secretary.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. Applications are invited for the post of RESIDENT ANÆSTHETIST (Senior House Officer grade) for duties in the United Hospitals (resident at either the General or the Queen Elizabeth Hospital). The post is tenable for 1 year. The appointment is recognised for the purpose of taking the F.F.A.R.C.S. examination.

Application forms may be obtained from the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15, and should be returned to him as soon as possible.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Mid-Worcestershire Group, Birmingham-road, Bromsgrove**

REGISTRAR (obstetrics/gynæcology). Duties at Bromsgrove General Hospital (423 Beds) (7 notional half-days), and Dudley and Stourbridge Group (4 notional half-days).

(2) **Coventry No. 20 Group, Coventry and Warwickshire Hospital, Coventry**

REGISTRAR (orthopædic surgery) for Hospital of St. Cross, Rugby (156 Beds). Vacant November. Some experience of traumatic surgery essential. Recognised F.R.C.S. Married accommodation available if required.

(3) **Birmingham (Selly Oak) Group, Oak Tree-lane, Birmingham, 29**

(*a*) REGISTRAR (orthopædic) for Royal Orthopædic Hospital, Birmingham. Vacant mid-November. F.R.C.S. desirable—experience in orthopædic surgery. Resident.

(*b*) REGISTRAR (pathology), Selly Oak and other hospitals (joint resident appointment with Senior House Officer). Now vacant. Wide experience in general pathology.

4. **South Warwickshire Group, 50, Holly-walk, Leamington Spa**

REGISTRAR (general surgery) for Stratford-on-Avon Hospital (163 Beds). Resident. Experience specialty desirable. Recognised F.R.C.S. Furnished house available.

Application forms from Group Secretaries to be returned by 11th November, 1957.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER required mid-November for established Geriatric Department under control of Consultant Geriatrician. There are 360 geriatric beds at Queen's Park Hospital, Blackburn, Springfield Hospital, Blackburn, and Clitheroe Hospital, Clitheroe. Accommodation for married man may be available if required.

Applications, with names of 2 referees, to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKBURN. QUEEN'S PARK HOSPITAL. BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (obstetrics and gynæcology) required for busy Unit of 58 Beds taking normal and abnormal cases. Post vacant 15th January, 1958. Recognised for Membership and Diploma R.C.O.G.(Obstetrics).

Apply to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKBURN. ROYAL INFIRMARY. (262 general beds.) BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER or SENIOR HOUSE OFFICER (casualty and orthopædics) required immediately. Junior Hospital Medical Officer post can be for any period up to 4 years. Recognised for F.R.C.S.

Apply to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKPOOL VICTORIA HOSPITAL. (354 Beds.) SENIOR HOUSE OFFICER (casualty and traumatic surgery) required for 1st December, 1957. Recognised for F.R.C.S. and offering wide variety of experience.

Applications, stating age, qualifications and experience and giving the names and addresses of 2 referees, should be sent to the Hospital Secretary.

BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIANS (pre-registration) required for Poole General Hospital on 22nd November, 1957, and for Poole General and Alderney Hospitals on 18th November, 1957.

Applications to the Hospital Secretary.

BURTON-ON-TRENT GENERAL HOSPITAL. Locum REGISTRAR (surgical) required at the above Hospital (approved for F.R.C.S.) on a week-to-week basis.

Applications, with full details, to Group Secretary, General Hospital, Burton-on-Trent.

BURTON-ON-TRENT. THE GENERAL HOSPITAL. HOUSE SURGEON (general, pre-registration) required at the above Hospital immediately. Post recognised for F.R.C.S.

Applications to Group Secretary as soon as possible.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. (494 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (resident or non-resident) (casualty and orthopædics combined) required for post vacant 19th November, 1957. The post is recognised for the F.R.C.S. examination and is normally tenable for 12 months. The Unit consists of a Registrar and 2 Senior House Officers with an additional Senior House Officer during the summer months.

Applications to the Hospital Secretary.

BRIDGEND GENERAL HOSPITAL, Quarella-road, BRIDGEND. (381 Beds.) MID GLAMORGAN HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (surgery). This Hospital is recognised for the F.R.C.S.

Applications, naming 2 referees, to be addressed to the Group Secretary of the Committee, 8, Wind-street, Neath.

BRIGHTON GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE PHYSICIAN to the Medical Unit. Vacant 22nd November, 1957. This is a pre-registration appointment. Salary in accordance with national scales.

Applications, enclosing recent testimonials, and stating age, qualifications, experience, and giving the names of 2 referees, should be sent to the Physician-Superintendent, Brighton General Hospital, Elm-grove, Brighton, 7, as soon as possible.

BRIGHTON. NEW SUSSEX HOSPITAL FOR WOMEN, Windlesham-road. BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE. Vacancy for HOUSE PHYSICIAN (Female) for 6 months commencing 2nd December, 1957. Open to pre-registration candidates.

Applications, stating age, nationality, qualifications and experience, with copies of 3 testimonials and/or the names of referees, to be sent to the Administrative Officer by 8th November, 1957.

BURY ST. EDMUNDS. WEST SUFFOLK GENERAL HOSPITAL. (262 Beds.) Applications are invited for the following posts :—

(*a*) HOUSE OFFICER (pre-registration) or SENIOR HOUSE OFFICER for orthopædic and casualty duties ; recognised for F.R.C.S. (surgical) ; vacant early January. A Junior Hospital Medical Officer is also employed.

(*b*) HOUSE PHYSICIANS for (i) general medical duties and (ii) pædiatric and general medical duties ; vacant early December.

(*c*) HOUSE SURGEONS for (i) general surgical and other duties ; and (ii) general surgical (latter recognised for F.R.C.S.) ; vacant early December and early January respectively.

(*d*) HOUSE SURGEON for gynæcological and obstetric duties, recognised for D.Obst.R.C.O.G. ; vacant late December.

(*e*) HOUSE PHYSICIANS (Locum Tenens) for general medical duties for periods mid-October to early November and mid-November to early December.

All posts except (*a*) as shown are recognised for pre-registration, but for post (*d*) considered advisable to have held previous appointment.

Applications to Hospital Secretary with testimonials or names of referees.

CAMBRIDGE. THE UNITED CAMBRIDGE HOSPITALS. ADDENBROOKE'S HOSPITAL. ANÆSTHETIC SENIOR HOUSE OFFICER for 1 year from December. Anæsthetic experience essential.

Apply to the Secretary immediately, stating age, nationality, qualifications and experience (with dates) and copies of 3 testimonials. Interviews mid-November.

CAMBRIDGE. THE UNITED CAMBRIDGE HOSPITALS. ADDENBROOKE'S HOSPITAL, CAMBRIDGE. Part-time GENERAL DENTAL PRACTITIONER for 1 half-day per week. The duties will include an Outpatient Clinic on Wednesday mornings followed by an operating session. The appointment will be subject to review annually. Salary £183 15s. p.a.

Applications, stating age, qualifications and experience, with names of 2 referees, to the Secretary, Addenbrooke's Hospital, by 16th November, 1957.

CARDIFF. GLAN ELY TUBERCULOSIS HOSPITAL, FAIRWATER, CARDIFF. SENIOR HOUSE OFFICER (resident) required at above Hospital.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF (near). PRINCE OF WALES ORTHOPÆDIC HOSPITAL, RHYDALFAR, near CARDIFF. SENIOR HOUSE OFFICER required. Regional orthopædic centre for South Wales area. 281 Beds and branch hospital of 70 Beds. Outpatient clinic in Cardiff. Full staff of Consultants and Registrars. Single accommodation available at Hospital at Rhydalfar.

Form of application from Group Secretary, 44, Cathedral-road, Cardiff.

CARDIFF. ST. DAVID'S HOSPITAL. Senior House OFFICER required for Accident Unit at above Hospital.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the post of REGISTRAR in Anæsthetics, to commence duty as soon as possible. The successful candidate will work as a member of the Department of Anæsthetics, partly in the Teaching Hospitals and partly in other hospitals in the area. Duties may include undergraduate teaching and assisting with research.

Application forms are available from the Secretary to the Board at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CANTERBURY. KENT AND CANTERBURY HOSPITAL (277 Beds). GYNÆCOLOGICAL HOUSE SURGEON required at Highland Court annexe, a unit of 25 gynæcological beds situated 3 miles from the above Hospital, with all ancillary services available. Recognised for M.R.C.O.G. 6 months' appointment. Post vacant early in December, 1957. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. ST. MARTIN'S MENTAL HOSPITAL. HOSPITAL MANAGEMENT COMMITTEE FOR ST. AUGUSTINE'S. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER (resident) at above Hospital with duties also at St. Augustine's Mental Hospital, Chartham, near Canterbury. There are at present 104 Beds in occupation at St. Martin's, chiefly for geriatric cases suffering from mental disorder. Terms and conditions of service as laid down for the National Health Service. A house is available for a married man.

Applications should be sent to the Physician-Superintendent, St. Martin's Hospital, Littlebourne-road, Canterbury, within 14 days from the appearance of this advertisement.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. (General Children's Hospital of 700 Beds.) HOUSE SURGEON (House Officer) (resident) required for 6 months (3 months general surgery, 3 months E.N.T. and orthopædics). Recognised for D.C.H. Applicants must have completed 12 months Pre-registration Service.

Applications, stating age and qualifications, together with 1 recent testimonial and the names of 2 referees, should be submitted to the Group Secretary, immediately.

CHELMSFORD. ST. JOHN'S HOSPITAL. (Recognised for M.R.C.O.G.) RESIDENT GYNÆCOLOGICAL HOUSE SURGEON. Appointment to commence as soon as possible. Preference will be given to candidates who intend to obtain the Diploma of Membership of the Royal College of Gynæcologists.

Applications, stating age, nationality, qualifications and experience, together with recent testimonials, should be sent immediately to the Secretary, Chelmsford Group Hospital Management Committee, Chelmsford and Essex Hospital, London-road, Chelmsford.

CHELMSFORD AND ESSEX HOSPITAL. (161 Beds.) Applications are invited for the post of RESIDENT HOUSE SURGEON. Pre-registration post. The post will become vacant during the middle of November, and offers good surgical experience. Recognised for the F.R.C.S.

Applications, together with 2 recent testimonials, to the Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (late Botley's Park War Hospital). (430 Beds.) ORTHOPÆDIC HOUSE SURGEON (Senior House Officer, or House Officer (Intern) grade). 100 orthopædic beds. Post recognised for F.R.C.S. and Pre-registration Service. Salary in accordance with terms and conditions of National Health Service. Post vacant 1st November, 1957.

Applications, together with names and addresses of referees, to be sent to the Physician-Superintendent, St. Peter's Hospital, Chertsey, as soon as possible.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (late Botley's Park War Hospital). CASUALTY OFFICER (Senior House Officer) required from 14th November, 1957. Resident or non-resident. The appointment is mainly that of Outpatient Sorting Officer and gives time and opportunity for reading for a higher qualification. Recognised for F.R.C.S. Salary in accordance with terms and conditions of National Health Service. Applications for a 6-month appointment would be considered.

Applications, together with names and addresses of referees, to Physician-Superintendent, St. Peter's Hospital, as soon as possible.

CHESTERFIELD. SCARSDALE HOSPITAL. Senior HOUSE OFFICER required for obstetrics and gynæcology at above Hospital. Post recognised for M.R.C.O.G. and D.Obst.R.C.O.G. purposes. National salary and conditions.

Further information obtainable from the Group Secretary, Chesterfield Hospital Management Committee, at Chesterfield Royal Hospital, to whom applications and copies of testimonials should be submitted immediately.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL (202 acute beds). RESIDENT HOUSE SURGEON required for 6 months' appointment. National salary scales for either provisionally or fully registered practitioners. Post approved for pre-registration practitioners and F.R.C.S. 8 residents. Vacant 17th November, 1957.

Applications, stating age, experience, qualifications, with references or names of referees, to Senior Administrative Officer.

CHICHESTER. ST. RICHARD'S HOSPITAL. Chichester GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of MEDICAL REGISTRAR, resident or non-resident, mainly at St. Richard's Hospital (400 Beds). Post vacant 1st January, 1958. Registrar will have care of 100 acute medical and pædiatric beds under the supervision of the Consultant Physicians and Pædiatrician, and will also assist the Consultant Neurologist, Chest Physician and Thoracic Surgeon. Salary according to terms and conditions of service of hospital medical staff. Candidates may visit the hospital.

Forms from Group Secretary, 174, Broyle-road, Chichester, to be submitted within 14 days.

DORCHESTER. DORSET COUNTY HOSPITAL. OBSTETRICAL AND GYNÆCOLOGICAL HOUSE SURGEON required for 6-monthly appointment, vacant early December, and recognised for D.Obst.R.C.O.G.

Applications, stating age, qualifications, experience and nationality, together with copy testimonials, to Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset, immediately.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) Applications are invited for the post of RESIDENT ANÆSTHETIST. Senior House Officer grade. Resident staff of 4. National Health Service salary and conditions of service.

Apply to the Secretary, Noble's Isle of Man Hospital, Douglas.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. ORTHOPÆDIC REGISTRAR, King's Lynn Hospital Group. Main Hospitals, West Norfolk and King's Lynn General and St. James's Hospital, King's Lynn. Appointment for 1 year, renewable for second year. Candidates invited to visit hospitals by direct arrangement with Hospital Management Committee Secretary, St. James's Hospital, King's Lynn.

RADIOLOGICAL REGISTRAR, Ipswich and East Suffolk Hospital (Anglesea Road Wing), Ipswich. The department is the centre for Consultant Radiological Services for the Ipswich Hospital Group. Post recognised for D.M.R.D. Part II examination. Appointment for 1 year, renewable for second year. Candidates invited to visit Hospital by direct arrangement with H.M.C. Secretary at the Hospital.

Applications, stating age, experience and the names of 3 referees, to Board's Senior Administrative Medical Officer, 117, Chesterton-road, Cambridge, by 11th November, 1957.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. ENFIELD GROUP HOSPITAL MANAGEMENT COMMITTEE. RESIDENT HOUSE SURGEON (pre-registration post), vacant now. Duties with General Surgical Unit, doing some genito-urinary work. Post recognised by the Royal College of Surgeons.

Application, with names and addresses of 2 referees, to the Group Secretary at Chase Farm Hospital.

EPPING. ST. MARGARET'S HOSPITAL. Senior House OFFICER as Casualty Officer and Orthopædic House Surgeon. Duties to commence 3rd December. Recognised training post for F.R.C.S.

Applications, with copies of 2 recent testimonials, to be sent to the Group Secretary, Epping Group H.M.C., Oak Cottage, The Plain, Epping, Essex, by 9th November, 1957.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. RESIDENT HOUSE PHYSICIAN required 6th December. Pre-registration post.

Applications, stating age, qualifications and experience, with copies of 2 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. RESIDENT HOUSE PHYSICIAN required immediately. Fully registered post.

Applications, stating age, qualifications and experience, with copies of 2 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. RESIDENT HOUSE SURGEON required 11th December. Pre-registration post recognised for F.R.C.S.

Applications, stating age, qualifications and experience, with copies of 2 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

GLASGOW. HAWKHEAD (MENTAL) HOSPITAL, 510, Crookston-road, GLASGOW, S.W.3. Applications are invited for the post of SENIOR HOUSE OFFICER in Psychiatry (Male or Female, resident or non-resident). The post offers wide experience and training in all aspects of psychiatry (inpatient and outpatient), and all modern methods of treatment are carried out. Recognised for D.P.M.

Applications, together with the names of 2 referees, should be forwarded as soon as possible to Physician-Superintendent at the above address.

GRANTHAM AND KESTEVEN GENERAL HOSPITAL. (118 Beds. Recognised for training for F.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. SECOND RESIDENT SURGICAL OFFICER with duties in Orthopædics, Gynæcology, E.N.T. and relief duties for Resident Surgical Officer required immediately. (Registrar rate of pay). Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 11th November, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

HASLEMERE AND DISTRICT HOSPITAL. (82 Beds.) GUILDFORD GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of SENIOR HOUSE OFFICER (surgical, with charge of 12 acute medical beds). Duties to commence 1st January, 1958. Valuable experience in general and emergency surgery, orthopædic, E.N.T., gynæcological, children and casualty work.

Applications to Hospital Secretary, Haslemere and District Hospital, Haslemere, Surrey, not later than 16th November.

HAYWARDS HEATH, SUSSEX. HURSTWOOD PARK HOSPITAL. SENIOR HOUSE SURGEON (neurosurgical) (resident) required at the above Hospital. Suitable accommodation available. Salary in accordance with the terms and conditions of service with appropriate deduction for residence.

Applications, with the names and addresses of 3 referees, to the Secretary to the Hospital Management Committee, St. Francis Hospital, Haywards Heath, Sussex.

HUDDERSFIELD ROYAL INFIRMARY. Huddersfield HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from provisionally registered medical practitioners for the post of HOUSE SURGEON to the Princess Royal Maternity Home (57 Beds), to commence duty on 1st December, 1957. The holder of the post, which is recognised for the D.Obst.R.C.O.G., will have access to the abnormal maternity and gynæcological beds at The Royal Infirmary. The Department is under the control of 2 Consultant Obstetricians and Gynæcologists. Salary in accordance with national scale.

Applications, with copies of 3 recent testimonials, to be addressed to—

H. J. JOHNSON, Secretary to the Management Committee.
The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) Applications are invited for the post of CASUALTY OFFICER. The post, which is resident, is recognised under the fellowship regulations and will be graded either Junior Hospital Medical Officer or Senior House Officer according to experience. Duties terminate at 7 P.M. with 1 night weekly on call.

Applications for the appointment, which will be vacant on the 22nd November, 1957, should be accompanied by copies of 3 recent testimonials and addressed to the undersigned.

H. J. JOHNSON, Group Secretary.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required to commence duty immediately. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scale.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD. ST. LUKE'S HOSPITAL. (235 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT MEDICAL OFFICER (Senior House Officer grade) at the above Hospital, to commence duties immediately. The Hospital caters for chronic sick, children, maternity and acute medical and surgical patients. Salary, in accordance with the terms and conditions of service for hospital medical and dental staffs, £819 10s. p.a.

Applications, together with copies of 3 recent testimonials, to be sent to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.

The Royal Infirmary, Huddersfield.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) Applications are invited for the appointment of HOUSE SURGEON (general), first or second post. To commence 27th November, 1957. Pre-registration post, recognised under F.R.C.S. regulations.

Applications to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HORNCHURCH. ST. GEORGE'S HOSPITAL. Ingre-BOURNE CENTRE. Temporary PSYCHIATRIC REGISTRAR required for not exceeding 3 months at the above Neurosis Unit. Mental hospital experience essential. Candidates should be specially interested in short term psychotherapy and social psychiatry. Further information may be obtained from the Hospital, which may be visited by arrangement (Tel.: Hornchurch 4181).

Applications, stating names of 2 referees, should be sent to the Group Secretary, Oldchurch Hospital, Romford.

HOUNSLOW HOSPITAL, Staines-road, Hounslow, MIDDLESEX. (General acute—81 Beds.) Applications are invited for the appointment of RESIDENT HOUSE SURGEON. Recognised pre-registration appointment for 6 months. Vacant 28th November, 1957.

Applications, stating qualifications and age, together with copies of 3 recent testimonials, or names for reference, to the Hospital Secretary.

ILFORD. KING GEORGE HOSPITAL. There will be a vacancy for a CASUALTY OFFICER at the above Hospital on 8th December, 1957, at a salary of £819 10s. p.a., resident or non-resident. Senior House Officer grade. This post is recognised for the F.R.C.S.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary,

Ilford and Barking Group Hospital Management Committee.

King George Hospital, Ilford.

ILFORD. KING GEORGE HOSPITAL, Eastern-avenue, ILFORD. There will be the following vacancies for HOUSE SURGEONS at above Hospital :—

First or second post pre-registration—17th December.

Second post pre-registration—8th December.

Both posts will be tenable for 6 months.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary, Ilford and Barking Group Hospital Management Committee.

ILFORD. KING GEORGE HOSPITAL, Eastern-avenue, ILFORD. There will be a vacancy for a HOUSE PHYSICIAN at above Hospital on 3rd December, 1957. First or second post pre-registration. The post will be tenable for 6 months.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary, Ilford and Barking Group Hospital Management Committee.

IPSWICH AND EAST SUFFOLK HOSPITAL, Heath-ROAD WING, IPSWICH. (280 Beds.) Post of HOUSE PHYSICIAN (pre-registrat'on) vacant 14th November, 1957.

Applications, stating qualifications, age, nationality, &c., with copies of 3 recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea-ROAD WING. Applications are invited for the post of HOUSE PHYSICIAN, vacant on 23rd November, 1957. Approved pre-registration post.

Applications, stating age, nationality and experience, together with copies of 3 recent testimonials, to reach the Hospital Secretary by 4th November, 1957.

KIDDERMINSTER AND DISTRICT GENERAL HOS-PITAL. (112 Beds.) Applications are invited for the pre-registration post of HOUSE SURGEON at the above Hospital. Post vacant shortly.

Applications, with the names of 3 referees, to the Hospital Secretary.

IRVINE. AYRSHIRE CENTRAL HOSPITAL. Resident JUNIOR HOSPITAL MEDICAL OFFICER required 1st December, Infectious Diseases Unit. House may be available.

Applications, stating qualifications, to Area Medical Superintendent, 1, Hill-street, Kilmarnock.

ISLE OF MAN. BALLAMONA HOSPITAL. Applications are invited for the post of SENIOR HOUSE OFFICER at the above Mental Hospital (360 Beds, admission rate 200 annually) which undertakes all modern methods in the treatment of mental and nervous diseases as well as mental deficiency, and is recognised for training for the Conjoint D.P.M. A choice of 2 furnished flats is available. The terms and conditions of service are those of the Isle of Man Health Service, the same as those of the National Health Service. Superannuation is transferable. The Hospital may be visited by appointment.

Those interested should write for further details, and applications, stating age, nationality, qualifications and experience, together with the names of 2 referees, should be sent to the Medical Superintendent.

KEIGHLEY AND DISTRICT VICTORIA HOSPITAL, KEIGHLEY, YORKS. (General—139 Beds.) 2 RESIDENT HOUSE SURGEONS (either sex).

General surgery and E.N.T., vacant now.

General surgery and orthopædics, vacant now.

Both recognised for F.R.C.S. and approved pre-registration appointments, tenable for 6 months in first instance. 4 residents on staff.

Applications, with full particulars as to age, nationality, and qualifications, and copies of 2 testimonials, to Group Secretary, St. John's Hospital, Keighley, Yorks.

LINCOLN COUNTY HOSPITAL, Sewell-road, Lincoln. (200 Beds.) Applications are invited from pre-registration candidates for appointment as HOUSE SURGEON for 6 months, to be followed, if satisfactory, by appointment as House Physician for a further 6 months.

Full particulars should be sent to R. W. HOWICK, Group Secretary.

LLANELLY HOSPITAL, Llanelly. (164 Beds.) Glantawe HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER in the Casualty Department of the above Hospital.

Full particulars, stating age, experience and qualifications, together with copies of 2 recent testimonials should be forwarded to the Hospital Secretary. T. E. JONES, Group Secretary.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. REGISTRAR required for the Radiotherapy Centre. Candidates with D.M.R. preferred. The post will be tenable for 1 year in the first instance and renewable for a second. Terms and conditions of service for hospital medical staff apply.

Applications, stating age, qualifications, previous posts with dates, with 3 names for reference, should be sent to the Sub-Dean, School of Medicine, Leeds, 2, by 8th November, 1957.

LEEDS. THE UNITED LEEDS HOSPITALS. THE GENERAL INFIRMARY AT LEEDS. REGISTRAR in Urology required for a period of 1 year in the first instance. Renewable for a second year. Post offers good experience either to candidates having already embarked upon training in general surgery or to those who wish to specialise in urology. Whitley conditions of service apply.

Applications, stating age, experience, qualifications, previous posts with dates, and 3 names for reference, should be sent to the Sub-Dean, the Medical School, Leeds, 2, by not later than 13th November, 1957.

LEEDS REGIONAL HOSPITAL BOARD. Short-term LOCUM TENENS appointments in the Registrar grade are constantly available at hospitals in the area of the Board, particularly in the specialties of anæsthetics, general medicine, general and orthopædic surgery, and psychiatry.

Interested practitioners, suitably experienced, should communicate with the Secretary, Joint Registrars Committee, Park-parade, Harrogate.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

Chest Diseases

Scotton Banks Sanatorium, Knaresborough. (200 staffed Beds.) Visiting staff includes Teaching Hospital Consultants. Resident.

Infectious Diseases

Leeds Road Hospital, Bradford (120 infectious diseases beds). Resident.

General Medicine

Halifax Group (110 general medical beds) (380 geriatric beds). Duties divided equally between general medicine and geriatrics. Non-resident.

Orthopædic Surgery

Marguerite Hepton Memorial Orthopædic Hospital, Thorpe Arch, Wetherby (78 long-stay children's beds). A 3-bedroomed, partly furnished, house is available in the hospital grounds.

Psychiatry

Storthes Hall Hospital, Kirkburton, near Huddersfield (2680 Beds), and associated clinics. Accommodation available for a single person. Facilities for attendance at the Leeds University will be provided if the successful candidate is studying for the D.P.M.

Rheumatism Research

Leeds Regional Hospital Board in association with the University of Leeds invites applications for the post of Research Registrar in Rheumatism to assist the Professor of Clinical Medicine with research projects at the Royal Bath Hospital, Harrogate, which is the centre for the Regional Rheumatism Scheme, or elsewhere in the Region.

Applications, stating age (sex in the case of Registrar in Rheumatism Research), qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 6th November, 1957.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

General Medicine

St. James's Hospital, Leeds. In addition to sharing the duties on acute medical admission days, the person appointed will be attached to the Medical Professorial Unit (44 Beds) and will also undertake duties in the Psychiatric Unit.

General and Orthopædic Surgery

(1) Halifax Group. 1 of 3 similar posts divided approximately between general and orthopædic surgery (195 general surgical and 85 orthopædic beds). May include some duties in the Casualty Department. Preferably resident.

(2) York A and Tadcaster Group. Resident or non-resident. Duties mainly at York County and City Hospitals. Aggregate of 110 general surgical and 70 orthopædic surgery beds. Duties divided between general and orthopædic surgery. May include some duties in the Casualty Department.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park Parade, Harrogate, by 8th November, 1957.

LEAMINGTON SPA. WARNEFORD GENERAL HOSPITAL. (197 Beds.) RESIDENT HOUSE SURGEON (general surgery). Post vacant. Recognised for pre-registration and F.R.C.S. Post provides excellent experience. Good accommodation available.

Applications, with 2 recent testimonials, to Hospital Secretary.

LEAMINGTON SPA. WARNEFORD GENERAL HOSPITAL. (197 Beds.) HOUSE PHYSICIAN. Vacancy suitable for fully registered or pre-registration applicant. Post vacant 15th November, 1957.

Applications, with copies of 2 recent testimonials, to be sent to Hospital Secretary.

LEICESTER (near). CARLTON HAYES HOSPITAL, NARBOROUGH, near LEICESTER. (1070 Beds. Recognised for D.P.M.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time REGISTRAR (psychiatry) required. Single accommodation available. Facilities for postgraduate study in conjunction with Sheffield University available. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fullwood-road, Sheffield, by 11th November, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

MANCHESTER (near). ROYAL MANCHESTER CHILDREN'S HOSPITAL, PENDLEBURY, near MANCHESTER. SALFORD HOSPITAL MANAGEMENT COMMITTEE. Applications invited for the resident appointment of SURGICAL HOUSE OFFICER, now vacant. Appointment tenable for 6 months and is open to pre-registration graduates.

Applications, with testimonials or names of referees, to the Hospital Secretary not later than 4th November, 1957.

MANCHESTER. UNITED MANCHESTER HOSPITALS. SAINT MARY'S HOSPITALS, MANCHESTER. Applications are invited for the post of REGISTRAR in the Neonatal Unit of Saint Mary's Hospitals (attached to the University Department of Child Health). The post is full-time and resident, and vacant 1st January, 1958. It is preferable but not essential that candidates should hold a higher qualification. Previous experience in pædiatrics essential. The post is tenable for 12 months and the salary is in accordance with the National scales.

Application forms may be obtained from the undersigned and should be completed and returned by 15th November, 1957.

A. R. WISE, General Superintendent.

Saint Mary's Hospitals, Whitworth Park, Manchester 13.

MANCHESTER REGIONAL HOSPITAL BOARD AND THE UNITED MANCHESTER HOSPITALS. SENIOR REGISTRAR in pædiatrics at Royal Manchester Children's Hospital, Pendlebury, and St. Mary's Hospitals, Manchester.

Application forms from the Senior Administrative Medical Officer, Manchester Regional Hospital Board, Cheetwood-road, Manchester, 8, should be returned by 11th November, 1957.

MANCHESTER REGIONAL HOSPITAL BOARD. HOPE HOSPITAL, SALFORD. SALFORD HOSPITAL MANAGEMENT COMMITTEE. ORTHOPÆDIC REGISTRAR required, 60 adult and children's beds. Duties also at Salford Royal and Royal Manchester Children's Hospitals.

Applications to Group Secretary, Salford Royal Hospital, Salford, 3, before 9th November, 1957.

MANCHESTER REGIONAL HOSPITAL BOARD. Applications are invited for the full-time post of ORTHOPÆDIC REGISTRAR in the Ashton, Hyde and Glossop Group of hospitals, with duties mainly at Ashton-under-Lyne General Hospital. There are approximately 40 orthopædic beds and busy Orthopædic and Casualty Outpatients Department. The post is recognised for additional training under F.R.C.S. regulations and is vacant on 5th November.

Applications, stating age, nationality, qualifications and experience, with copies of 2 references, should be forwarded to the Group Secretary, Ashton, Hyde and Glossop Hospital Management Committee, General Hospital, Ashton-under-Lyne, Lancashire, as soon as possible.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. WYTHENSHAWE HOSPITAL (402 Beds). The Board invite applications for the post of REGISTRAR in Chest Diseases. This Hospital is a large Thoracic Unit fully equipped for the medical and surgical treatment of tuberculosis and other chest diseases. Attached to the hospital is a Chest Clinic. The post offers opportunities for wide experience in medical and surgical treatment of patients suffering from tuberculosis and other diseases of the chest, together with chest clinic work. Ample scope for clinical research.

Applications, stating age, qualifications, nationality, experience and the names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, within 7 days of appearance of this advertisement.

MANCHESTER REGIONAL HOSPITAL BOARD. Bury AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. FAIRFIELD GENERAL HOSPITAL, BURY, LANCS. Applications are invited for the post of REGISTRAR in Obstetrics and Gynæcology at the above hospital. The post is recognised for the D.Obst.R.C.O.G. There is a bungalow available at the hospital for the occupier of this post.

Apply, stating full details of experience, qualifications and names of 2 referees, to H. WILKINSON, Group Secretary.

Bury General Hospital, Bury, Lancs.

MEXBOROUGH. MONTAGU HOSPITAL AND ANNEXE. (198 Beds—22 obstetric, 15 gynæcology.) Locum SENIOR HOUSE OFFICER (obstetrics and gynæcology) required 16th to 29th December, 1957. Residential emoluments £150 p.a.

Applications to Secretary, Hospital Management Committee, Fern Bank, Doncaster-road, Rotherham.

NANTWICH. BARONY HOSPITAL. Junior Hospital MEDICAL OFFICER (resident), temporary or permanent, required for duties in Department of Psychiatry (93 Beds), which is a very active unit, including Outpatient Clinics and Outpatient Treatment Centre. Personal supervision and teaching by Consultant Psychiatrist. Good experience available in all methods of treatment. Quarters for a single person are available at the Hospital.

Apply immediately, stating age, qualifications, &c., with names of 2 referees, to Group Secretary, South Cheshire Hospital Management Committee, Barony Hospital, Nantwich, Cheshire.

NEWCASTLE REGIONAL HOSPITAL BOARD. Senior REGISTRAR ANÆSTHETIST, whole-time, for Regional Thoracic Centre (150 Beds), Shotley Bridge General Hospital. Work almost entirely non-tuberculosis (cardiovascular, œsophageal, and pulmonary) and at associated sanatoria. Single resident accommodation available. To reside near Shotley Bridge General Hospital if non-resident.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Newcastle Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 28 days.

NEWCASTLE REGIONAL HOSPITAL BOARD AND UNITED NEWCASTLE UPON TYNE HOSPITALS. SENIOR MEDICAL REGISTRAR, whole-time joint appointment. The appointee will be attached to Clinical Team No. 1 at the Newcastle General Hospital (850 Beds) for the first year.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Newcastle Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWMARKET GENERAL HOSPITAL, Suffolk. Applications are invited for the post of HOUSE PHYSICIAN, vacant 21st December, 1957. Duties include house charge of general medical and pulmonary tuberculosis beds. The post is recognised for pre-registration, is resident and tenable for 6 months. Salary in accordance with national scale.

Applications, with 3 recent testimonials, to Medical Superintendent.

NEWCASTLE REGIONAL HOSPITAL BOARD. Registrar ORTHOPÆDIC SURGEON, whole-time, for the Gateshead Group of Hospitals (approximately 150 orthopædic Beds). Single accommodation available. Married accommodation may be available.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne 6, within 14 days.

NEWMARKET GENERAL HOSPITAL, Suffolk. Applications are invited for the post of SENIOR HOUSE OFFICER for Orthopædic and Casualty duties, which falls vacant in early December. The post is resident.

Applications, giving age, experience and qualifications, together with 3 recent testimonials, should be sent to the Medical Superintendent.

NORWICH. NORFOLK AND NORWICH HOSPITAL. JUNIOR ORTHOPÆDIC HOUSE SURGEON required. 2 House Officers employed in the department. This is a pre-registration post. Membership of a Medical Defence Society is a condition of appointment.

Applications, giving full details, with names of 2 referees, to Group Secretary, Hospital Management Committee, St. Stephen's-road, Norwich, immediately.

NOTTINGHAM GENERAL HOSPITAL. A Senior House OFFICER (orthopædic and fracture) required as soon as possible. Post offers exceptional experience in traumatic surgery. Locum considered for any period.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. (452 Beds. Recognised for D.Path.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (pathology) required 1st December. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 11th November, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

NOTTINGHAM CITY AND NOTTINGHAM CHILDREN'S HOSPITALS. SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (orthopædics) required from 1st January. Duties at Nottingham City Hospital (54 orthopædic beds) and Nottingham Children's Hospital (23 orthopædic beds). Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 11th November, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

NOTTINGHAM. CITY HOSPITAL. (811 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (general surgery) vacant 23rd December. The post is approved for the F.R.C.S. The officer appointed will also be required to undertake certain duties in the Orthopædic Department. A deduction of £150 p.a. will be made for residential emoluments.

Applications, stating age, nationality, qualifications and experience, together with copies of not more than 3 testimonials, to be sent to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM CHILDREN'S HOSPITAL. (136 Beds. Recognised for the D.C.H.) Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) which will be vacant end November. The post is tenable for 6 months or a year by agreement.

Applications, with copies of 2 testimonials, should be sent to the Secretary, Nottingham Children's Hospital, Chestnut-grove, Nottingham.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE SURGEON, mainly orthopædic and genitourinary surgery. This is a pre-registration appointment.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 19th November, 1957.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE PHYSICIAN to the Radiotherapy Department. This post is recognised as a pre-registration appointment.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 19th November, 1957.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer), recognised by the Royal College of Surgeons. Vacant 1st December, 1957.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 19th November, 1957.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE SURGEON for general surgery. Recognised for the final F.R.C.S. in general surgery, and recognised as a pre-registration appointment.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 19th November, 1957.

OXFORD. UNITED OXFORD HOSPITALS. THE RADCLIFFE INFIRMARY. Applications are invited for the post of REGISTRAR/RESEARCH ASSISTANT to the Accident Service from the 1st December, 1957. The duties of this post will be divided equally between the clinical duties of the Registrar appointment, and research work in the Department, under the supervision of the Director of the Accident Service.

Applications, on forms obtainable from the Administrator, Radcliffe Infirmary, Oxford, should be received not later than 8th November, 1957.

OXFORD REGIONAL HOSPITAL BOARD. Medical REGISTRARS (2): (*a*) Registrar in General Medicine, Stoke Mandeville Hospital, Aylesbury, (*b*) Registrar to the Diseases of the Chest service in the Aylesbury area. The holders of these 2 posts will exchange duties after a period not exceeding 12 months, and wide experience and training is available. Opportunities are also given for using the postgraduate facilities available at the Teaching Centre at Oxford. High qualifications desirable.

Applications, on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 16th November, 1957.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL. Vacancies exist in the following departments:

SENIOR HOUSE OFFICER in Surgery, vacant 1st December. Recognised for the F.R.C.S., Devonport Hospital.

HOUSE SURGEON (Pre-registration post), vacant immediately. Recognised for the F.R.C.S., Devonport Hospital.

HOUSE PHYSICIAN (Pre-registration post), vacant 1st January, 1958. Greenbank Road Hospital.

HOUSE SURGEONS (Pre-registration posts), vacancies 9th December, 1957, 1st and 4th January, 1958. Recognised for the F.R.C.S. Greenbank Road Hospital.

In all cases send names of 3 referees to the Group Secretary, 7, Nelson-gardens, Devonport.

POOLE GENERAL HOSPITAL, Longfleet-road, Poole. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEONS (pre-registration) required for 25th November and 15th December, 1957. Posts recognised for F.R.C.S. and F.R.C.S.Ed.

Applications to the Hospital Secretary.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Royal Portsmouth Hospital

(1) **Orthopædic Department** (104 Beds)

(*a*) SENIOR HOUSE OFFICER required. Vacant 1st December, 1957.

(*b*) HOUSE OFFICER (pre-registration), vacant now.

(2) SENIOR HOUSE SURGEON (70 surgical beds). Vacant 11th November, 1957.

Applications, stating age, experience and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

St. Mary's Hospital, Milton-road, Portsmouth.

RICHMOND, SURREY. ROYAL HOSPITAL. House SURGEON (pre-registration) required 27th November for busy acute General Hospital with full consultant staff.

Applications invited immediately (acceptable in advance of examination results) giving age, qualifications, and names of 2 referees, to Administrative Officer.

READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER to the Department of Geriatric Medicine which is being developed at Battle Hospital, Reading, under the charge of a Consultant Geriatric Physician.

Further particulars may be obtained from the Group Secretary, 3, Craven-road, Reading, to whom applications, stating age, qualifications and names of 3 referees, should be addressed.

READING. ROYAL BERKSHIRE HOSPITAL. (398 Beds.) Applications are invited from registered and provisionally registered medical practitioners, Male and Female, for resident post of HOUSE SURGEON, vacant 1st December, 1957, and tenable for 6 months.

Write, before 15th November, stating age, qualifications with dates, nationality, present post, with copies of 2 recent testimonials, to Secretary.

READING AREA DEPARTMENT OF MEDICINE. Applications are invited from registered and provisionally registered medical practitioners for 2 posts as RESIDENT HOUSE PHYSICIAN vacant 1st December, 1957, for a period of 6 months. Successful candidates will be required to carry out duties at the following Reading hospitals: Royal Berkshire (398 Beds), Battle (390 Beds), and Prospect Park (104 Beds).

Write immediately, stating age, qualifications with dates, nationality, present post, with copies of 2 recent testimonials, to Secretary, Royal Berkshire Hospital, Reading.

READING. BATTLE HOSPITAL. (391 Beds.) Applications are invited from registered medical practitioners for the post of RESIDENT JUNIOR HOUSE SURGEON in the Accident and Orthopædic Department. Post vacant 1st November, 1957. F.R.C.S. recognised. Also casualty duties.

Apply, stating age, qualifications with dates, nationality, present post, with 1 copy of recent testimonial, to Hospital Secretary.

ROCHESTER, KENT. ST. BARTHOLOMEW'S HOSPITAL. (Recognised for F.R.C.S.) MEDWAY AND GRAVESEND HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of CASUALTY OFFICER (Senior House Officer grade) which offers good experience with fractures and emergency surgery. Post vacant now. Tenable for 12 months. Salary £819 10s. p.a.

Applications, stating age, nationality, qualifications and experience, with recent testimonials, to be addressed to the Hospital Secretary.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL (722 Beds). ORTHOPÆDIC HOUSE SURGEON (resident) required in the Orthopædic and Accident Unit from 3rd December, 1957. The service consists of 100 Beds equally divided between traumatic surgery and "cold" orthopædics. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications to be sent to Group Secretary, Romford Hospital Management Committee, Oldchurch Hospital, as soon as possible.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS BOARD OF GOVERNORS and SHEFFIELD REGIONAL HOSPITAL BOARD. Reciprocal training scheme for Senior Registrars. Whole-time SENIOR REGISTRAR in Anæsthetics required with initial tenure of appointment at the City General Hospital, Sheffield (680 Beds), a large general hospital having teaching affiliations with the University of Sheffield and with Professorial Medical and Gynæcological Units, a Department of Thoracic Surgery and a Regional Cardiological Centre. Appointment for 1 year in first instance and renewable thereafter annually. Incumbent will be transferred to the Teaching Hospitals for the second phase of the appointment in accordance with arrangements under the Reciprocal Training Scheme. Renewal of appointment and transfer to the Teaching Hospitals will be subject to satisfactory work and progress.

Further details and form of application from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Fulwood House, Old Fulwood-road, Sheffield, 10. Forms to be returned by 11th November, 1957.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications invited for the following posts:—

(*a*) REGISTRAR required in Neurological Surgery at the Royal Infirmary. Experience in this specialty desirable but not essential. Appointment would be most valuable to trainee surgeon who may eventually have care of head injuries. If so desired appointment might be held for 6 months only.

Closing date for applications 13th November.

(*b*) REGISTRAR in Psychiatry required to work under the Consultant Psychiatrist and Professor of Psychiatry in the newly-established Psychiatric Department. There will be opportunities for postgraduate training and research.

Closing date for applications 5th November.

(*c*) Resident post of REGISTRAR or SENIOR HOUSE OFFICER at the Children's/Jessop Hospital, in association with the Department of Child Health in the University of Sheffield. The post is a rotating one between the 2 hospitals, alternating with another Registrar, so that the successful candidate will spend half his time in charge of the newborn babies at the Jessop Hospital and half his time in the Professorial Department at the Children's Hospital. Post vacant December 10th.

Closing date for applications 5th November.

Applications for the above posts should state age, qualifications and experience, give the names of 3 referees, and be sent to the Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

SALISBURY GENERAL HOSPITAL. Applications are invited for the appointment of RESIDENT HOUSE SURGEON to the Obstetric and Gynæcological Department, which becomes vacant on 1st January, 1958. The post is open to pre-registration candidates and is recognised for the Diploma and Membership of the Royal College.

Apply, stating age, nationality, qualifications, experience, and giving names and addresses of 2 referees, to Group Secretary, Salisbury Group Hospital Management Committee, Odstock Hospital, Salisbury.

SALISBURY GENERAL HOSPITAL. Paediatric House. OFFICER required at Odstock Branch. 55 medical and surgical beds. Recognised for D.C.H. Vacant 25th January.

Applications, with names and addresses of 2 referees, to Group Secretary, Salisbury Group Hospital Management Committee, Odstock Hospital, Salisbury.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time post of REGISTRAR at the County Hospital, Stornoway (tuberculosis and infectious diseases). A house is available for a married officer.

Further particulars and forms of application are available from the undersigned, with whom applications should be lodged by 19th November, 1957. A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.

Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR (resident) in Obstetrics and Gynæcology in the Professorial Unit at the Royal Infirmary of Edinburgh and the Simpson Memorial Maternity Pavilion, vacant on 1st January, 1958.

Apply, giving particulars of age, qualifications and previous experience, together with the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 16th November, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in Obstetrics and Gynæcology in the professorial charge at the Royal Infirmary of Edinburgh and the Simpson Memorial Maternity Pavilion.

Apply, giving particulars of age, qualifications and previous experience, and the names of 3 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh 3, by 23rd November, 1957.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance :—

SENIOR REGISTRAR in Medicine based at Stobhill General Hospital, Glasgow, for duties at the Western District Hospital, Glasgow.

SENIOR REGISTRAR in Medicine based at Hairmyres Hospital, East Kilbride.

SENIOR REGISTRAR in Plastic Surgery at the Royal and Western Infirmaries, Glasgow, for duties with the Regional Consultant in Plastic Surgery.

SENIOR REGISTRAR in Pathology based at the Southern General Hospital, Glasgow.

REGISTRAR in Medicine based at the Royal Alexandra Infirmary, Paisley.

REGISTRAR in Medicine based at the Southern General Hospital, Glasgow.

REGISTRAR in Psychiatry based at Woodilee Mental Hospital, Lenzie, near Glasgow.

REGISTRAR in Surgery based at Hairmyres Hospital, East Kilbride.

REGISTRAR in Dermatology based at the Western Infirmary, Glasgow.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 9th November, 1957.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance :—

SENIOR REGISTRAR in Ophthalmology based at the Eye Infirmary, Glasgow.

REGISTRAR in Medicine based at the Glasgow Royal Infirmary with duties for a period at Belvidere Infectious Diseases Hospital, Glasgow.

REGISTRAR in Medicine based at Larkfield Hospital, Greenock.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 16th November, 1957.

SOUTHAMPTON EYE HOSPITAL. (32 Beds. Recognised for D.O. Examination.) RESIDENT SENIOR HOUSE OFFICER required in December.

Applications, with copies of testimonials, should be forwarded as soon as possible to Secretary, Southampton Group Hospital Management Committee, Bullar-street.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (274 Beds. Recognised for F.R.C.S.) ORTHOPÆDIC HOUSE SURGEON (post recognised for Preregistration Service and tenable for 6 months). The Hospital is the centre to which all trauma from a large industrial town and port is directed, thus providing excellent experience in the treatment of traumatic conditions; patients with orthopædic conditions are drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (274 Beds.) RESIDENT HOUSE SURGEON required. Pre-registration candidates eligible.

Applications, with copies of recent testimonials, should be forwarded to Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SHREWSBURY. ROYAL SALOP INFIRMARY/COPTHORNE HOSPITAL. (500 Beds.) Senior House Officer to work as CLINICAL PATHOLOGIST to Group Laboratory. Appointment tenable for 1 year, resident or non-resident. Vacant 1st January, 1958. A Unit of the Public Health Laboratory service is housed in the same building and there are facilities for training in all the 4 main branches of pathology.

Applications to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury, naming 3 referees.

SHREWSBURY. EYE, EAR AND THROAT HOSPITAL. SENIOR HOUSE OFFICER (E.N.T.). Duties at E.N.T. Hospital (68 Beds) and Copthorne Hospital (168 Beds). Post recognised for the D.L.O.R.C.S. Vacant immediately.

Applications, with copy testimonials, to the Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. HOUSE SURGEON required, pre-registration post, vacant 27th November.

Applications, with names of 2 referees, to Secretary.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum MEDICAL REGISTRAR required from 17th November.

Applications, with names of 2 referees, to Secretary.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum HOUSE SURGEON required 9th–22nd November.

Applications, with names of 2 referees, to Secretary.

SOUTH CHESHIRE HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (anæsthetics). 6–12 months. Duties mainly at Surgical Hospital, Crewe (120 Beds), and Maternity Unit, Barony Hospital, Nantwich. Recognised D.A. Previous experience not necessary. New theatres with perfect air conditioning and later anæsthetic apparatus and equipment. Personal supervision and teaching by Consultant.

Apply, not later than 11th November, 1957, stating age, qualifications, &c., with names of 2 referees, to the Group Secretary, Barony Hospital, Nantwich, Cheshire.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Anæsthetics to fill a vacancy in the approved trainee establishment at the Tunbridge Wells Group of hospitals, for duty mainly in the Plastic Surgery and Jaw Injuries Centre at the Queen Victoria Hospital, East Grinstead. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staff (England and Wales) and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, London, W.1, not later than 16th November, 1957.

ST. ALBANS CITY HOSPITAL, St. Albans, Herts. (384 Beds.) Locum Tenens ANÆSTHETIC REGISTRAR (resident) required from 20th November to 12th December, 1957, inclusive. Post recognised for D.A. and F.F.A.R.C.S.

Applications to Secretary, Mid Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans.

STOCKPORT INFIRMARY, Stockport. (163 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Assistant Resident Surgical Officer) (general and orthopædics), vacant 18th November, 1957. The post is recognised for the F.R.C.S.

Applications, stating age, experience and qualifications, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw Heath, Stockport.

STOCKPORT. CHERRY TREE HOSPITAL. (Isolation—96 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER. This Hospital is associated with Manchester University for the study of Infectious Diseases, and the successful candidate will have ample opportunity for study.

Applications, with full particulars and copies of 2 recent testimonials, to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport, Cheshire.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. Applications invited for HOUSE OFFICER (Medical)—vacant now. Recognised pre-registration.

Detailed applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. (815 Beds.) HOUSE OFFICER (general surgery) required, vacant now. Pre-registration post. Hospital recognised for F.R.C.S.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER (ophthalmology) required. Recognised F.R.C.S. and D.O.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. ORTHOPÆDIC HOSPITAL, HARTSHILL, STOKE-ON-TRENT. (78 Beds.) SENIOR HOUSE OFFICER (orthopædics) required. Duties also at North Staffordshire Royal Infirmary.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

SUTTON AND CHEAM HOSPITAL, Cotswold-road, SUTTON, SURREY. RESIDENT SENIOR HOUSE OFFICER (Casualty Officer). Post recognised for F.R.C.S. Vacant now.

Applications, stating age, qualifications and experience, with copies of recent testimonials and the names of 2 referees, to the Group Secretary, St. Helier Hospital, Carshalton, Surrey.

SUTTON, SURREY. BANSTEAD HOSPITAL. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER at the above Hospital of 2400 Beds, which caters for all forms of nervous and mental disorders. The post offers an excellent opportunity for training in psychiatry and in particular in preparation for the D.P.M. for which courses of clinical instruction, including psychology are arranged. Accommodation is available for a single person at a moderate charge.

Applicants should apply to the Physician-Superintendent, Banstead Hospital, Sutton, Surrey, as soon as possible after the appearance of this advertisement.

STRATFORD-ON-AVON HOSPITAL. (163 Beds.) RESIDENT HOUSE SURGEON. New post providing excellent experience.

Applications, with 2 recent testimonials, to Hospital Secretary.

TAPLOW, MAIDENHEAD. CANADIAN RED CROSS MEMORIAL HOSPITAL. HOUSE SURGEON required for the Unit of Obstetrics and Gynæcology, vacant 1st December. Post recognised for M.R.C.O.G.

Applications, stating age, experience, and qualifications with dates, with copies of 2 testimonials, to Secretary.

TAUNTON AND SOMERSET HOSPITAL, Taunton, SOMERSET. (423 Beds.) HOUSE OFFICER (general surgery) required. Pre-registration post recognised for F.R.C.S. 2 posts vacant, 28th November, 1957, and 9th January, 1958, respectively.

Applications, stating age, nationality and qualifications, to the Group Secretary, Taunton Hospital Management Committee, c/o Musgrove Park Hospital, Taunton, Somerset, immediately.

TORQUAY. TORBAY HOSPITAL. (166 general beds.) RESIDENT HOUSE OFFICER (surgical), Male or Female, required approximately 15th December, 1957. Post recognised for F.R.C.S. and pre-registration purposes. There is a complement of 6 Resident House Officers.

Applications, stating qualifications, nationality and age, together with copy testimonials (quoting reference F.955/84), to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay, S. Devon.

TUNBRIDGE WELLS (near). PEMBURY HOSPITAL, PEMBURY. Applications invited for appointment of SENIOR ORTHOPÆDIC HOUSE SURGEON AND CASUALTY OFFICER (Senior House Officer grade) to begin duties as soon as possible. Recognised F.R.C.S. (Eng.) and tenable for 1 year. Work includes treatment of long and short stay cases and traumatic surgery with large Outpatient and Fracture Clinics under 2 Consultants.

Apply, stating age, qualifications and experience, together with 3 testimonials, to Group Secretary, Sherwood Park, Pembury-road, Tunbridge Wells.

TUNBRIDGE WELLS (near). PEMBURY HOSPITAL, PEMBURY. TUNBRIDGE WELLS GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications invited for vacant post of HOUSE SURGEON in Orthopædic Unit. Pre-registration post.

Apply, stating age, qualifications, together with testimonials, to Surgeon-Superintendent.

WAKEFIELD. STANLEY ROYD HOSPITAL. Locum Tenens JUNIOR HOSPITAL MEDICAL OFFICER in Psychiatry required. Salary £19 5s. per week. Accommodation for single person at charge of £3 5s. 6d. per week.

Address written applications to W. BOWRING, Group Secretary. Pinderfields General Hospital, Wakefield.

WARRINGTON INFIRMARY. Applications are invited from Males and Females for the post of RESIDENT CASUALTY OFFICER (graded as Junior Hospital Medical Officer) at the above Hospital. The post becomes vacant on 1st November, 1957, and is recognised for the F.R.C.S. Scale of salary £852 10s.–£55–£1182 10s., less a deduction of £170 for the residential emoluments. A whole-time Senior Hospital Medical Officer is in charge of the Department.

Applications, stating age, experience and qualifications, should be forwarded to—

HENRY L. BOOT, Group Secretary,
Warrington and District Hospital Management Committee,
c/o General Hospital, Warrington, Lancs.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. CASUALTY OFFICER (Senior House Officer). Modern Department employing 3 full-time Casualty Officers with Surgeon in charge. Post recognised for F.R.C.S. Resident or non-resident (sleeping in duty nights), vacant immediately.

Applications, with names of 2 referees, to the Administrator.

WATFORD. SHRODELLS HOSPITAL. (320 Beds.) Applications are invited for the post of HOUSE PHYSICIAN (pre- or post-registration), to take up duty about 1st December.

Applications, with copies of 2 recent testimonials, should reach the Medical Officer in Charge as soon as possible.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens REGISTRAR in General Surgery required Caerphilly District Miners' Hospital immediately for approximately 3 months.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

WELSH REGIONAL HOSPITAL BOARD.

REGISTRAR (general surgery), Pembroke County War Memorial Hospital, Haverfordwest. (Resident or non-resident.)

REGISTRAR (psychiatry), St. David's Hospital, Carmarthen (1000 Beds). All modern forms of treatment carried out. Extensive outpatient service undertaken. Hospital recognised for training for D.P.M. Flat available.

Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WESTCLIFF HOSPITAL, Balmoral-road, Westcliff-on-SEA, ESSEX. Applications are invited for the post of RESIDENT MEDICAL OFFICER (Senior House Officer grade). Post vacant 15th December, 1957. The Hospital covers a wide field of medicine and offers excellent training for general practice.

Applications should be sent to the Secretary, General Hospital, Prittlewell Chase, Southend-on-Sea, Essex, not later than 14th November. J. C. FIELD, Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOS-PITAL. (315 Beds.) HOUSE OFFICER (anæsthetics). Post vacant 1st January. The Hospital is recognised for the F.F.A.R.C.S. and D.A.

Applications, with copies of 2 testimonials, to the Group Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOS-PITAL. (315 Beds.) HOUSE PHYSICIAN (pre-registration) vacant 1st January.

Applications, with copy of 2 testimonials, to the Group Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOS-PITAL. (315 Beds.) HOUSE SURGEON (post recognised by Royal College of Surgeons) required for general surgery with some E.N.T. duties. Approved pre-registration post. Vacant 1st December.

Applications, with copies of 2 testimonials, to Group Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOS-PITAL (315 Beds). SENIOR HOUSE OFFICER (orthopædics) required. Post recognised F.R.C.S. Wide experience available under Area Orthopædic team. Appointment for 6 months in first instance. Vacant 11th November.

Applications, with copies of 2 testimonials, to the Group Secretary.

WINDSOR. KING EDWARD VII HOSPITAL House PHYSICIAN required, Male or Female, for post vacant 1st December. Pre-registration post.

Applications, stating age, qualifications with dates, and nationality, and copies of 3 recent testimonials, to Secretary, by 6th November.

WINDSOR. KING EDWARD VII HOSPITAL. House SURGEON In General and Orthopædic Surgery required, Male or Female, for post vacant 11th December. Pre-registration post—Hospital recognised for F.R.C.S.

Applications, stating age, qualifications, with dates, and nationality, to Secretary by 8th November.

WINDSOR. KING EDWARD VII HOSPITAL. House PHYSICIAN (pædiatrics) required. Male or Female, for post vacant 13th December. Pre-registration post—Hospital recognised for D.C.H. Successful candidate will be resident at Old Windsor Unit of the Hospital.

Applications, stating age, qualifications, with dates, experience and nationality, to Secretary by 8th November.

WINTERTON MENTAL HOSPITAL. Winterton Hos-PITAL MANAGEMENT COMMITTEE. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER (psychiatry), at above Hospital for a period not exceeding 4 years. The appointment offers valuable experience in all branches of psychiatry at this large mental hospital where all modern forms of treatment are carried out, both at inpatients and outpatient level. The hospital is recognised for the D.P.M. Residential accommodation is available for married or single applicants at a very moderate charge. Conditions of service in accordance with the latest recommendations of the Whitley Council. Salary £852 10s.–£55–£1182 10s.

Application forms can be obtained from C. W. GILL, Group Secretary.

Winterton Hospital, Winterton,
Sedgefield, Stockton-on-Tees.

WORCESTER ROYAL INFIRMARY. (213 Beds.) Senior HOUSE OFFICER (surgical) required for 1st December at this busy acute hospital which is the consultative and accident centre of the Group. The post, which is recognised for the F.R.C.S. examinations, is deputy to the Surgical Registrar and involves some orthopædic work.

Applications to Hospital Secretary.

CANADA. OSHAWA GENERAL HOSPITAL, Alma-street, OSHAWA, ONTARIO. (Modern 350-Bed General Hospital.) Has a vacancy on INTERN STAFF. Training programme in effect. Applicants will be considered for immediate acceptance and also for future appointments. Uniform, room, meals, laundry supplied, in addition to $100 per month.

Reply to W. A. HOLLAND, Superintendent.

MICHIGAN, U.S.A. OAKWOOD HOSPITAL, Dearborn, MICHIGAN. Applications are invited for 1 or 2-year approved GENERAL PRACTICE RESIDENCY in modern 234-Bed General Hospital 10 miles from Detroit. Excellent facilities. Hospital approved for exchange-visitor programme. Beginning monthly salary $250 if single, $300 if married. Free housing.

Apply: Director.

REDDY MEMORIAL HOSPITAL, Westmount, Montreal. British Graduates required as SENIOR INTERNES from June, 1958. Salary: $150 per month, with full board and lodging. Also, RESIDENT in Medicine. Salary $225.

Apply Executive Director.

U.S.A. JEWISH CHRONIC DISEASE HOSPITAL, BROOKLYN, N.Y. Clinical pathology. 1st or 2nd year RESIDENT. Fully approved 800 Bed active research hospital. 250,000 tests annually; includes steroid, enzyme and histochemistry, electrophoresis, hormone assays and radioisotopes.

Apply: Jewish Chronic Disease Hospital, E. 49th St. and Rutland-road, Brooklyn, N.Y.

U.S.A. BETHESDA HOSPITAL, Cincinnati 6, Ohio, U.S.A. INTERNS—Rotation through Obstetrics, Medicine, Pediatrics and Surgery in a 12-month broad teaching programme. We desire applications from graduate medical doctors giving full details in first letter. $210 per month stipend; access to inexpensive meals; furnished room; uniforms; laundry; hospitalisation, and will advance passage one way.

Please apply to the Superintendent.

Public Appointments

FACTORY DOCTORS. Factories Acts, 1937 and 1948. The following appointments as APPOINTED FACTORY DOCTOR are vacant. Apply to Chief Inspector of Factories, 19, St. James's-square, London, S.W.1:—

District	*County*	*Latest date for receipt of applications*
DARLINGTON ..	DURHAM ..	16TH NOVEMBER, 1957
SOUTHWELL ..	NOTTINGHAM ..	16TH NOVEMBER, 1957
SWINDON ..	WILTS	16TH NOVEMBER, 1957

ISLINGTON METROPOLITAN BOROUGH COUNCIL and LONDON COUNTY COUNCIL. Applications invited from registered medical practitioners with D.P.H. for joint appointment as DEPUTY MEDICAL OFFICER OF HEALTH in Metropolitan Borough of Islington and MEDICAL OFFICER in London County Council Public Health Department. Person appointed will be required to give 3 sessions a week to County Council work and remainder of his/her time to Borough Council work, the duties therefore comprising work in both personal and environmental health services. Salary for the appointment in range £1618–£1956 (starting point dependent on local government experience).

Application forms obtainable from Medical Officer of Health, Town Hall, Upper-street, N.1, to be returned by 15th November. (1944.)

BIRMINGHAM. CITY OF BIRMINGHAM. Public Health DEPARTMENT. Applications are invited for the appointment of ASSISTANT MEDICAL OFFICER (Male or Female) for Maternity and Child Welfare. The duties will be mainly in connection with maternity and child welfare as well as the medical aspects of the care of deprived children in the care of the Children's Department. If the successful applicant has the D.P.H. it is hoped to provide an opportunity to gain administrative experience. Salary scale £1050–£50(3)–£55(5)–£1475 p.a. with placement on the scale according to qualification and experience. Pension scheme (including Widows and Orphans); medical examination.

Applications, giving full particulars of qualifications and experience, together with names of 3 persons to whom reference may be made, to be sent to Medical Officer of Health, Council House, Birmingham, 5, not later than 18th November, 1957.

CORNWALL COUNTY COUNCIL. Applications are invited from registered medical practitioners who have had experience in Child Guidance work for the whole-time appointment of COUNTY PSYCHIATRIST. The person appointed will be responsible to the County Medical Officer for the general administration of the County Council's Mental Health Services, and the duties will include the certification of mentally defective persons, the holding of Child Guidance Clinics, and such other duties in connection with Mental Health as may be assigned to him from time to time. Applicants should hold the Diploma in Psychological Medicine, and be recognised or eligible for recognition by the Ministry of Education and by the Board of Control for the ascertainment and certification of educationally subnormal children and mentally defective persons. Salary will be on the scale of £1520 rising by annual increments to £1955 a year, the initial salary depending on previous experience of the candidate selected. A car is essential, and there will be a travelling allowance in accordance with the County scale. The post is subject to the Local Government Superannuation Acts, and the successful candidate will be required to pass a medical examination.

Applications, stating age, nationality, qualifications and experience, together with copies of 2 recent testimonials and the names of 2 persons to whom reference may be made, should reach the County Medical Officer, County Hall, Truro, not later than 16th November, 1957. E. T. VERGER,
County Hall, Truro. Clerk of the County Council.

MANCHESTER. CITY OF MANCHESTER. Health DEPARTMENT. MEDICAL OFFICER required for administrative and clinical duties in the General Services Division of the Health Department. D.P.H. desirable but not essential. Salary £1050–£1475.

Application forms, obtainable from the Town Clerk, Town Hall, Manchester, 2, should be returned to him not later than 9th November, 1957.

NAVY, ARMY AND AIR FORCE INSTITUTES. Applications are invited from general practitioners in the undernoted towns for the appointment in a part-time capacity as MEDICAL OFFICERS to this Corporation. Successful applicants would be required to examine and report on the condition of employees of the Corporation who may be referred to them from time to time. Fees for this work will be paid on a scale agreed with the British Medical Association.

Applications, giving details of qualifications and experience, should be sent to the Chief Medical Officer, Navy, Army and Air Force Institutes, Kennington-lane, London, S.E.11, not later than 9th November, 1957.

The towns for which applications are invited are:—

SHEFFIELD	DERBY	GRANTHAM
BEVERLEY (YORKS)	DARLINGTON	STAMFORD

STOKE-ON-TRENT. CITY OF STOKE-ON-TRENT. PUBLIC HEALTH DEPARTMENT. Applications are invited from qualified medical practitioners for the post of ASSISTANT MEDICAL OFFICER, mainly on the Maternity and Child Welfare Services. Candidates should have experience in diseases of children and obstetrics. Opportunity will be given for hospital contact with Paediatrics and Obstetrics. The possession of a D.P.H. or D.C.H. will be considered an additional qualification. The salary will be at the rate recommended by the Whitley Council, with commencing salary according to experience. The appointment will be subject to the provision of the National Health Service (superannuation) regulations 1947, and the successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the Medical Officer of Health, Public Health Department, Glebe-street, Stoke-on-Trent, and should be returned, accompanied by copies of not more than 3 recent testimonials, not later than Saturday, 16th November, 1957. HARRY TAYLOR, Town Clerk.

WESTMEATH COUNTY COUNCIL. Resident Medical OFFICER required at County Hospital, Mullingar, for a period of 6 months, subject to extension. Salary will be at the approved rate together with rations and apartments. Credit will be given for previous service in a recognised hospital.

Application should be made immediately to the County Secretary, County Buildings, Mullingar.

WARWICKSHIRE COUNTY COUNCIL. County Medical OFFICER OF HEALTH'S DEPARTMENT. ASSISTANT COUNTY MEDICAL OFFICERS OF HEALTH (Male or Female). Applications are invited from registered medical practitioners for the above 2 permanent appointments, which are in the Sutton Coldfield and Rugby Areas of the County respectively. Preference will be given to those holding the D.P.H. or D.C.H. and with previous experience. Conditions of service and salary (£1050 to £1475) will be in accordance with the Whitley Council. The successful candidate will be required to provide a motor car in the performance of duties, for which Whitley Council scale allowances are payable.

Further particulars, including details of duties, and application forms may be obtained from the County Medical Officer of Health, Shire Hall, Warwick. Closing date for applications is 16th November, 1957. L. EDGAR STEPHENS,
Shire Hall, Warwick. Clerk of the Council.

GOVERNMENT OF BRITISH GUIANA. MEDICAL SUPERINTENDENT required to take charge of Mental Hospital at Berbice, to supervise staff, patients, revenue and expenditure, and the psychiatric clinic held monthly at Georgetown.

Appointments as follows :—

(*a*) On contract for 3 years with gratuity (taxable) of 22½% of basic salary payable at 6 monthly intervals or in lump sum on completion of engagement; or

(*b*) from National Health Service retaining superannuation rights (up to 6 years) and receiving a gratuity (taxable) of 20% of aggregate salary after engagement.

Salary £1800 a year, plus allowance of £250 in lieu consultation fees. No private practice. Income-tax at local rates. Free unfurnished quarters provided. Generous leave. Free passages for officer, wife and children under 18, not exceeding 5 persons in all, on appointment and completion of engagement.

Candidates must possess medical qualifications registrable in United Kingdom and have had 2 years' experience in Mental Hospital. Diploma in Psychological Medicine highly desirable.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting BCD. 117/30/05).

HER MAJESTY'S OVERSEAS CIVIL SERVICE. TRINIDAD. Applications for following posts invited from doctors with qualifications registrable in United Kingdom. D.P.H. and 3 years' public health experience following Diploma required for (*a*), D.P.H. and 3 years' postgraduate experience for (*b*), D.P.H. preferable but not essential for (*c*).

(*a*) MEDICAL OFFICERS (Grade "A"—Public Health) for duties of Medical Officers of Health including public health administration, environmental sanitation, maternity and child welfare services, school health, communicable disease control, housing, &c., and implementation of laws relating to public health. Salary scale £1500–£1600 a year. Consulting practice but not private pratice permitted.

(*b*) MEDICAL OFFICERS (Grade "B"—Public Health). Duties in the same fields as for (*a*) above. Salary scale £1400–£1500 a year. Consulting and private practice not permitted.

(*c*) MEDICAL OFFICERS (Grade "C"—Public Health). Subordinate duties as in (*a*) and (*b*) above. Salary scale £950–£1350 a year. Consulting and private practice not permitted.

Appointments on permanent basis with pension (non-contributory); or on agreement; or from National Health Service with retention of superannuation rights (up to 6 years) and gratuity (taxable) of 20% of aggregate salary on completion of engagements. Only permanent officers are members of Her Majesty's Overseas Civil Service.

Government quarters, if available, at low rental or allowance in lieu. Free passages for officer, wife, and children under 18 years, not exceeding 5 persons in all and up to 3 on leave. Educational facilities available. Income tax at local rates. Generous leave.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting BCD. 117/38/020).

HER MAJESTY'S OVERSEAS CIVIL SERVICE. BRITISH GUIANA. Applications invited from doctors with qualifications registrable in United Kingdom for following posts. Possession of a Diploma in Pathology or Bacteriology would be an asset for (*a*).

(*a*) PATHOLOGIST for New Amsterdam and Mental Hospitals, to have charge of laboratory staff, buildings and equipment, to supervise laboratories of Government hospitals and be responsible for training of laboratory technicians. Salary £1600 a year plus £250 a year (non-pensionable) in lieu of consultation fees.

(*b*) MEDICAL OFFICERS for usual duties of Government Medical Officer in any part of Colony. May first be under supervision of experienced Medical Officer in a Public Hospital. Salary scale £950–£1450 a year.

Appointments on permanent basis with pension (non-contributory) 1/600th of final pensionable emoluments for each completed month of service; or on contract for 3 years' resident service with gratuity (taxable) of 22½% of salary for each 3 months' service. Candidates from National Health Service may retain superannuation rights during service abroad (up to 6 years) and receive gratuity of 20% of salary on leaving overseas employment. (Only permanent officers are members of Her Majesty's Overseas Civil Service.)

Free unfurnished quarters or allowance of £100 a year in lieu when attached to an Institution. In districts where quarters available rent payable at 10% of salary. Free passages for officer, wife and children under 18 years up to 5 persons in all. Assisted passages for officer and wife on leave.

Application forms from Director of Recruitment Colonial Office, London, S.W.1 (quoting BCD. 117/30/019).

SOUTH CORK BOARD OF PUBLIC ASSISTANCE. Vacancy for ANÆSTHETIC REGISTRAR, St. Finbarr's Hospitals. Remuneration: £862 10s. p.a.

Application forms and particulars may be obtained from The County Manager, Courthouse, Cork, with whom completed applications should be lodged not later than 12 o'clock noon on Saturday, 9th November, 1957.

COMHAIRLE CONNDÆ NA MIDHE. The Meath County COUNCIL invite applications for the position of Temporary Part-time ANÆSTHETIST. Rate of remuneration as approved by the Department of Health.

Full details and application forms may be had from the Chief Officer, Health Offices, Meath County Council, An Uaimh, Co. Meath, Ireland. Latest date for receipt of completed application forms Tuesday, 12th November, 1957, at 5 P.M.

GOVERNMENT OF THE EASTERN REGION OF NIGERIA. Applications invited from doctors with medical qualifications registrable in the United Kingdom for the following posts :—

MEDICAL OFFICERS for general medical duties in urban and rural areas.

MEDICAL OFFICERS OF HEALTH for administration of environmental hygiene, maternal and child welfare, school health, health education and control of communicable diseases. Women eligible, and would be encouraged to concentrate on school health and welfare duties. At present emphasis is being placed on development of a school health service and on tuberculosis control. Officers may be required to visit rural areas around the township where their principal responsibility lies. Candidates must possess D.P.H.

Appointments on contract with gratuity (taxable) payable on completion of satisfactory engagement at rate of £37 10s. for each completed period of 3 months' service (including leave). Salary scale £1344–£2118 a year, for Medical Officers and £1530–£2118, plus £100 a year staff pay, for Medical Officers of Health.

Quarters provided at rental of 10% of salary. Taxes at local rates. Annual local leave permissible ; generous home leave after each tour. Free return passages for officer and wife ; and, when appropriate, either (but not both) of the following in any 1 tour of service :—

(*a*) 1 return sea passage for each of 2 children under age 18 subject to maximum of £75 for the return journey for each child, or

(*b*) an allowance of £75 a year for each of 2 children under age 18 maintained outside Nigeria for the whole tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting BCD. 117/411/016).

GOVERNMENT OF QATAR in the Persian Gulf has 2 vacancies in the State Medical Department for:

1. GENERAL SURGEON, who must hold the F.R.C.S.
2. OPHTHALMOLOGIST.

Applicants should state age, qualifications, experience and send copies of recent testimonials.

Salary: In the scale Rs. 3500 per Arabic month (equivalent to £3150 p.a.) rising to Rs. 4100 (equivalent to £3690 p.a.)

Contract offered is for 5 years subject to 6 months probationary period. Gratuity paid on completion of contract. Leave: 6 days for each month of duty. Free accommodation, fuel, light, water. No income-tax.

For further details please apply in writing to Messrs. C. Tennant, Sons, & Co., Ltd., 4 Copthall-avenue, London, E.C.2.

HER MAJESTY'S OVERSEAS CIVIL SERVICE. Northern REGION, NIGERIA. Applications invited from doctors with medical qualifications registrable in the United Kingdom for the following appointments :—

MEDICAL OFFICERS for general duties which may include charge of a large hospital and its administration, or rural health duties which will require living under bush conditions.

MEDICAL OFFICER OF HEALTH for administration of preventive medical service and control of sanitary matters (including statutory duties of a Medical Officer of Health), or if posted to an airport the duties of Port Health Officer. May be required to perform general duties of Medical and Health Officers and other duties in connection with epidemic diseases. Possible posting to undertake rural health work including medical surveys and mass treatment of endemic diseases. Candidates must possess D.P.H. Diploma in Tropical Hygiene an asset.

Appointment may be:—

(*a*) on 3 years' probation for permanent and pensionable employment. Pension (non-contributory) at rate of 1/600th of final pensionable emoluments for each completed month of reckonable service;

(*b*) from National Health Service, officer retaining superannuation rights up to 6 years and receiving a gratuity (taxable) of 20% of aggregate of salary. Salary for officers appointed under (*a*) or (*b*) ranges from £1212 to £1950 p.a. ; or

(*c*) on short-term contract (2 tours each of 12–24 months) with salary £1434 to £2286, and gratuity (taxable) of £37 10s. for each completed period of 3 months' service (including leave).

Only permanent officers are members of Her Majesty's Overseas Civil Service.

Quarters provided at low rental. Taxes at local rates. Annual leave permissible; generous home leave granted after each tour. Free passages in both directions for officer and wife; assisted passages for children. Allowances for children of £120 a year for first child, £96 for second, and £72 for third.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting BCD. 117/408/03).

JERSEY CIVIL SERVICE. Applications are invited for the post of DEPUTY MEDICAL OFFICER OF HEALTH. The appointment will be made in Group C of the Administrative grade, £1250–£25–£1500. Applicants must be on the British medical register and hold the Diploma of Public Health. The post will be pensionable under a non-contributory pension scheme, and the Civil Service Board is in the course of making reciprocal pension arrangements in respect of officers transferring from the English Local Government Service.

Application forms, which should be completed and returned to the Greffier of the States not later than 23rd November, 1957, may be obtained from the States' Greffe, St. Helier, Jersey, C.I.

18th October, 1957. F. DE L. BOIS, Greffier of the States.

General Practice

For an **Executive Council post** *(England and Wales) apply on form* E.C.16A *obtainable from the council. Mark envelope "Vacancy."*

Required, Associate for active Obstetrical and Gynæcological Practice in Western Canadian University City. Must be eligible for, or preferably have, membership.—Address No. 338, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Hospital Services: Non-Medical Appointments

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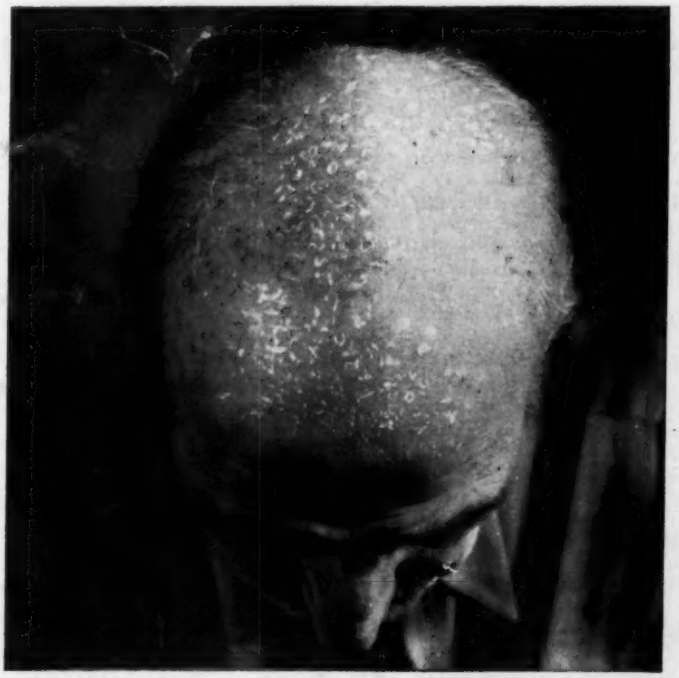

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